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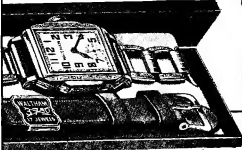


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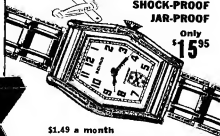
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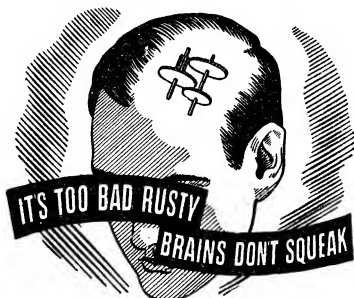
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MARCH
1937

ASTOUNDING STORIES

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Causes Many Ills

Dr. Walter R. George, many years Health Commissioner of Indianapolis, recently stated: "Most people do not realize this, but the kidneys probably are the most remarkable organs in the entire human anatomy. Their work is just as important and just as vital to good health as the work of the heart. As Health Commissioner of the City of Indianapolis for many years and as medical director for a large insurance company, I have had opportunity to observe that a surprisingly high percentage of people are debilitated, rundown, nervous, tired, and worn-out because of poorly functioning kidneys."

If your kidneys slow down and do not function properly and fail to remove approximately 3 pints of Acids, Poisons, and liquids from your blood every 24 hours, then there is a gradual accumulation of these Acids and Wastes, and slowly, but surely your system becomes poisoned, making you feel old before your time, rundown and worn out.

Many other troublesome and painful symptoms may be caused by poorly functioning Kidneys, such as Getting Up Nights, Nervousness, Leg Pains, Dizziness, Frequent Headaches and Colds, Rheumatic Pains, Swollen Joints, Circles Under Eyes, Backaches, Loss of Vitality, Burning, Itching, Smarting, and Acidity.

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28x40-45	1.85 .45	30x6	2.50 1.00
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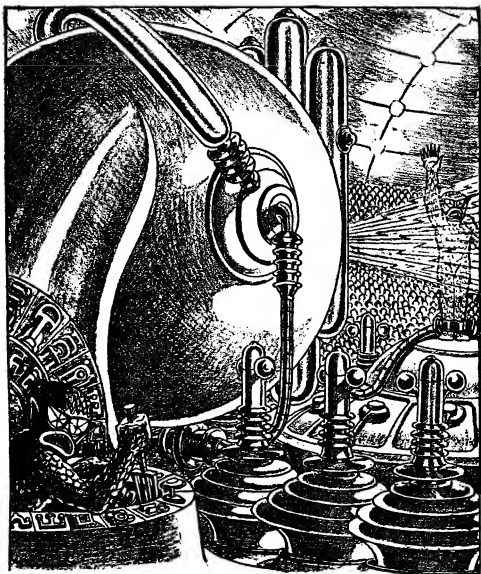
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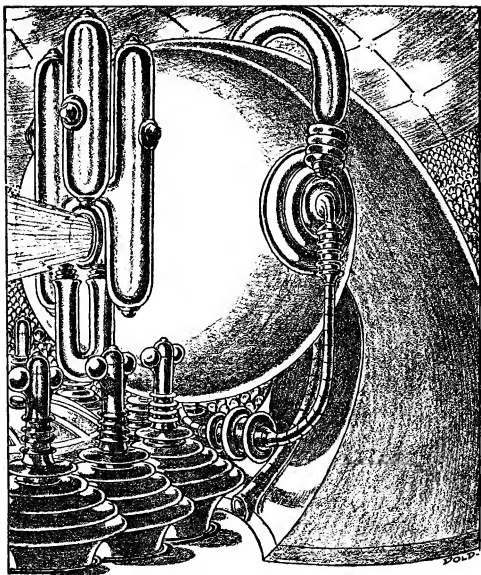
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WORLDS WITHIN

*A Menace created by a scientist's
ambition—wherein a sub-atomic
universe reveals its power to expand.*

by JOHN RUSSELL FEARN



With calm patience Vaspus waited, then, at last, raised his queerly fashioned hand for the experiment to begin.

THE VAST INTERIOR of the Martian hall of science was droning with the sound of eager voices, rising up to the mighty vaulted roof with its vitriex-filtered glass to seize in fullest measure the life-giving radiations of the red planet's distant Sun.

Tier upon tier, fifty in all, rose the

serried lines of Martians—immense, red-skinned creatures, unclothed, queer body scales rising and falling evenly as they absorbed the essential solar radiations. Creatures almost fantastic in appearance, and yet masters of science and all it had to offer, staring now with huge, faceted eyes toward the shining metal

floor of the colossal place, and at the complicated apparatus and dais that graced its extreme center. Mouths were open, talking rapidly, revealing triple rows of dangerous, backward-slanting teeth.

The hour of experiment had arrived. Every scientist of the red planet was present, anxiously waiting.

Then suddenly the talking died away; there came the solemn hush of respect and interest. With a slow and measured tread, Vaspus, master of the red planet, marched into view from the tremendous central doorway, accompanied, as ever, by Lothan, his chief adviser, and Ithos, attendant scientist.

The master's faceted eyes glanced over the tremendous assembly as he walked; he inclined his big, scaly head slightly at the murmur of salutations directed toward him. Then, with the same impartial dignity, he gained the dais amidst the machinery and raised a powerful seven-fingered hand for silence. Immediately dead calm descended. Lothan and Ithos stood to one side.

Vaspus adjusted the minute microphone before him and spoke quietly.

"Fellow scientists, I have assembled you all here to-day for a very definite purpose: to behold a recent achievement in science. For a considerable time—in fact, ever since we arrived on this planet from our own doomed world of Aries—I have been irritated by the fact that we should have to die, and also that we do not use in our lifetime one tenth of the intelligence of which we are capable."

Vaspus paused for a moment, studied his attentive listeners, then resumed.

"Let us first take the problem of age. We all suffer from katabolism; the cells of our bodies break down perpetually. These we build up with food, nutriments, solar rays—but in the end we find the breakdown is swifter than any process of anabolism we can devise. That, in its turn, is linked inevitably with fading mentality. In its last efforts, at the point

of extreme age, to repair the perpetual waste the blood stream flows less readily to the brain. Concentration becomes erratic. Often on the verge of a masterful discovery we find senility has us in its grip. We die. Our normal life span of three hundred years is pitifully short in which to wrest the ultimate secrets of the cosmos."

The multitude gave a murmur of assent.

"Therefore, to the end of defeating death and of giving us bodies that can live eternally, I have devised this machine," the master went on, motioning to the apparatus grouped about him. "We have long known that cosmical radiations are solely responsible for the creation of life; but, hard though we have labored, we have never been successful in releasing life in inert protoplasmic elements. Since that is so, we shall, for the time being, have to accept that defeat with good grace. But out of the struggle there emerges one great truth: if we cannot create life, we can at least forestall death!

"With this machine I generate cosmic rays, called such for want of a better name. You may be aware of the exact nature of creating these radiations. Normally they occur at the explosion of a supernova in galaxial space, the resulting explosion generating hundreds of millions of electron volts. Recently such an occurrence happened in the constellation known as Ramino. Actually, of course, that event took place seven million years ago, the light only just reaching us. Our instruments were able to pick up the radiations and revealed a generation of nearly seven million electron volts.

"KNOWING from our calculations that this would happen, we devised, in our laboratories, machinery capable of trapping these brief radiations, directed them upon seedlings, permitting different quantities of the radiation to seep

through. The lesser the quantity of cosmical rays—measuring, incidentally, one tenth of a million millionth of a centimeter—the more the seedlings were stimulated; the greater the quantity, the more they were sterilized—proving, beyond doubt, that between the great and small doses there lies one—and only one—fixed degree wherein actual life is possible. Presumably, when life first began to spawn in this universe, when life first came to our own world of Aries, it was created by this one particular wave length, which has since been too strong or too weak to create further life.

"I repeat: we have tried to utilize these radiations to produce life, but there is something missing. No matter what percentage of power we use, we cannot excite living energy into inert chemicals; the reason is probably because the conditions of this planet are not conducive to life. It is so different to our lost, beloved Aries." For a moment the ruler's voice quavered slightly, then he went on again. "I shall, therefore, use it to prevent senility and decay, for it has been definitely proven that it operates perfectly on flesh that is already living, arrests katabolism completely. Within these spheres"—he indicated two gigantic reinforced metal globes—"highly energized blocks of metal will be disintegrated into free energy, allowed to release radiation that is precisely identical to cosmic rays, automatically adjusted to the required power by those triple rectifiers you see in the background. It is only owing to the untiring diligence of Lothan that this machinery has become possible."

The adviser bowed his scaly head; an odd light was in his huge eyes as he looked up again.

Steadily, Vaspus continued. "I shall place myself between the two spheres, absolutely in line with the invisible radiation that will stream from one to the other. Earthing and neutralizing devices clamped to my feet and thence di-

rected to insulating machinery will save me from being blasted into infinity and will instead allow my body to be charged with cosmical radiation, arresting for some hundred years or more all possible chance of senility. In another century it will become necessary to undergo the same treatment again. If it is a success, my friends, we know that we have defeated age and death—may continue our researches to eternity!"

"As always, you have courage, master," murmured Lothan smoothly.

Vaspus turned to him. "Courage? It is not a question of courage, my friend, when the machinery has been tested and proved accurate. Let the experiment proceed! I, as ruler, shall be the first to test it."

The assembled Martians became tense, every eye fixed upon their master as he calmly stepped into the complicated, machinery-cluttered area between the two immense generating globes. In solemn, absorbed silence the audience watched heavily insulated clamps fastened about his thick, scaly ankles, the massive, double-covered earthing wires leading back to the complex neutralizing plant. With calm patience Vaspus waited, then at last raised his queerly fashioned hand for the experiment to commence.

The safety lights in the glass roof, burning night and day, suddenly dimmed at the terrific drain on the city's power resources; incalculable volts of electrical energy were created by the suddenly whining dynamos, rising up from a low and steady hum to a shrieking, ear-splitting din. Electrodes protruding from each of the massive spheres gathered the power unto themselves; strange, gas-filled tubes connected to them began to writhe internally with incredibly brilliant lavender light.

Lothan shouted a question and the ruler nodded. In response, the adviser threw in a tremendous four-pole switch on the complex control board. All the disordered rioting of electricity suddenly

took on an understandable meaning. The seething electronic power fast disintegrating the metals within the spheres rose to an absolute pitch, brought about the annihilation of matter. The squirmings of electricity in the glass tubes became mere floods of unbearably brilliant flame, hurled their power into the electrodes.

THE ASSEMBLY watched stupefied, suddenly sprang to their feet in concern for their ruler as there abruptly streamed from the electrodes coruscating streamers of mauve flame—electrical energy that blazed and twisted with the vivid savagery of untamed lightning. And between these streamers stood Vaspus, unmoved, his scaly body painted by flickering purple and blackest shadow. Only the raising of his arm revealed that he was still unhurt, the neutralizing machines working faultlessly to save his body from being shattered into powder by the immeasurable powers hurled upon him.

For nearly ten minutes the amazing pyrotechnic electrical display continued, raised the temperature of the hall by nearly twenty degrees. Then Lothan cut out the main switch, followed it up by moving the others, and the shrieking dynamos swept down the scale and became still. The tubes flickered and expired; the red-hot electrodes turned into the blackness of fast-cooling metal.

Silence fell—the dead and astounded silence of a baffled multitude, broken only, at last, by a long exhalation of relief as Vaspus raised his arms in salutation.

"Age is ended!" he cried exultantly. "This day we of Mars, formerly of Aries, have conquered death! We are the masters of life and all it has to offer. Lothan, unfetter these clamps."

Quietly, the adviser obeyed, stood back with a concerned expression on his ugly face.

"My lord feels none the worse?" he inquired softly.

"Not in the slightest," Vaspus answered complacently. "We have done well between us, Lothan—have given to our race a priceless heritage."

Lothan nodded silently, watched as his master stepped forward amidst the now approaching multitude from the tiers. In Lothan's eyes there reposed the light of strange knowledge, of a buried secret. Upon his thick lips was the faintest suggestion of a cynical smile.

"Eternal life," he murmured to himself. "I wonder——"

He prepared to move and follow his ruler, then paused at a light touch on his shoulder. Turning quickly he beheld Ithos.

"The experiment has been a success, Lothan," he muttered bitterly. "I thought you said it would destroy that old dotard. Do you realize what this means? Eternal life for him; the failure of possible dominance and leadership for us. You—you blunderer!"

Lothan smiled twistedly, directed a glance toward the multitude seething round their ruler.

"You would do well, Ithos, to choose your words more carefully when in earshot of our fellows," he answered coldly. "I knew Vaspus would live through the experiment. We cannot afford to take chances; you have got to remember that the people love him. Remember, too, that he trusts me implicitly—and you, too. Not for a moment does he suspect that our real aim——"

"That doesn't interest me," Ithos snapped with brutal directness. "You have given him eternal life—unless, of course, we deliberately murder him. It would have been so easy! One slip of the electrode switches and—— Our ascension to the kingship would have been simple!"

"And the people eternally doubting us? Against us because we destroyed the king? No, my friend." Lothan

shook his head. "To-day I have given him eternal life—but also eternal death! Never was a man so surely doomed; never was a king so utterly deposed without knowing it."

"I don't understand you," Ithos breathed. "How can he—"

"You'll learn in good time, my friend. Just watch, make no false moves, and leave everything to me. That's all."

With that Lothan turned, and with majestic tread joined his jubilant ruler, immediately becoming the same subservient scientist he had always been. Lothan, besides being a scientist, was a first-class actor.

II.

THROUGH THE DAYS that followed, the normal, ordered course of science proceeded on the red planet. The twin dominant cities in the equatorial and north polar regions of the globe continued to throb with intellectual activity.

Mars, still a young world, blessed with pure air, mainly cloudless skies and all-the-year-round sunshine—weak as compared to the Sun of departed Aries—but enough for the scaly monsters to extract from it a high percentage of essential life-giving radiations.

Though the Arians had made a thorough study of the celestial bodies about them they were quite convinced that no other worlds held life. The four giant monsters in the deeps beyond the inner circle were desolate, utterly immature; the most advanced stage seemed to lie on the cloud-ensheathed third inner planet, its atmospheric blanket only parting rarely to reveal beneath a rolling waste of ocean or landscapes in the throes of gigantic change and reformation.

Superminds in a young system. There was something paradoxical about it, and yet it was only the outcome of

having to leave a world in the last stages of collapse. Mars was a young and lovely world, and of all the inhabitants upon it, Lothan perhaps realized the fact with the most clearness. It stirred jealousy in his soul that Vaspus should be lord of it—a jealousy not even yet eradicated by countless years of scientific achievement. Within him burned ambition. To the end of becoming ruler he had labored unceasingly, not to give Vaspus eternal life, but infinite death. And, in the background of this strange intrigue there hovered Ithos, brutally efficient, but lacking the finesse and personality of his even more unscrupulous colleague.

The days following the cosmic-energy experiment found Lothan still inquiring after his master's welfare, found his face becoming darker as he learned that Vaspus was in perfect health, pursuing with more avidity than ever his experiments into the realms of atomic science, the last state of nature to baffle his brilliant mind. Indeed, far from being ill, he was so satisfied with his condition that he gave orders for all the members of his race to be treated by the cosmic-energy machine at the earliest moment—orders which Lothan received with studied calm.

"I think, master, that it would be better to postpone such a benefit—at least for a while," he remarked suavely within the immense experimental laboratory.

"Why?" There was surprise in Vaspus' tone, but he did not look up from his machinery.

"Because, master, you are our ruler, and as such are actually the only one entitled to immortality. A thing of value is only such because of its rarity. Make us all immortal and we lose the greatness of our achievement."

"A strange viewpoint, Lothan," Vaspus commented, looking up at last. "We created immortality for the good of us all. Proceed with the arrangements for us all to receive the benefits."

Lothan bowed. "I will do so, master. Before I go, however, might I inquire how your atomic investigations are proceeding?"

"Favorably. We are undoubtedly up against enormous difficulties. In constructing this apparatus for viewing the atomic universe one has to work with more than normal care. Manifestly, the only way to accomplish the feat of rendering the microcosm viewable is by vibration. Every atom in the microcosm emits vibrations of force, which in turn have to be amplified much the same as we now amplify a tiny sound to world-wide range. There are difficulties, but I think we shall overcome them."

Lothan looked reflectively over the accumulation of machinery, reflected transiently on the years that had been spent on this particular branch of science.

"The last details still elude me," Vaspus went on thoughtfully. "The very act of trapping the microcosmic vibrations creates strange and unpredictable electronic changes. It is, I think, caused by the vibrations emanating from the amplifying machinery itself. The slightest pressure, the slightest movement, even the pressure of a weak beam of light, produces the most unexpected results. I am working now on the principle of absolute dark and absolute steadiness. I have little reason to believe but what another two weeks will see success. Then, my friend, we shall solve the ultimate riddle of nature. The secrets of the infinitely small. We know the universe about us is almost empty, but are the worlds that teem about us in invisibility likewise empty? That I cannot believe."

"Only the machinery can show," Lothan answered quietly, and with that left the laboratory, bumped almost immediately into Ithos in the main corridor.

"Well?" he demanded roughly. "Is his death any nearer?"

Lothan frowned. "No—not yet; but

it will come. Have patience. In the meantime, see to it that the cosmic-energy machine breaks down. You know its construction almost as well as I do. Burn out a series of wires; do anything you like, so long as you produce a natural accident. Under no circumstances is that machine to be used on anybody else—at least, not until we know the exact reactions on Vaspus."

Ithos shrugged his mighty shoulders. "I'll attend to it now." He nodded, and swiftly departed, leaving Lothan in deep thought.

"It's *got* to succeed," he muttered. "If not, then all the laws of science must be in vain."

TO LOTHAN'S intense satisfaction, he found Vaspus less convinced of his good health as the sunny Martian days sped by. Though the ruler spent his time perfecting the final details of his amazing atomic-penetrator apparatus, he was clearly a sufferer from some strange and inexplicable ailment.

For the first three days of the disease's onset he refused rigidly to pay attention to it, mastered rising pain with a set face and firm mouth, wrestled steadily with his scientific problems. Lothan was ever by his side, outwardly concerned and inwardly jubilant.

"Master," he said at length, "I feel that you should take a rest. You are obviously unwell, unable to proceed."

Vaspus smiled twistedly. "It is nothing—cannot be. For hundreds of cycles ill health has been unknown amongst us. How can I possibly be unwell?"

"Perhaps—the experiment—" Lothan murmured, eyes on his work.

Vaspus looked up sharply. "That was two weeks ago, Lothan; it cannot have effect now. No—no, the thing is absurd! Maybe I have not been receiving my full quota of solar radiations, been working too long in this stuffy laboratory. I will be all right. I cannot afford to slacken my efforts now.

Within the next twelve hours this apparatus will be complete. We will be ready to view the atomic microcosm that teems invisibly about us."

Lothan did not respond, continued steadily with his work.

So, steadily, through the required twelve hours, Vaspus struggled, with iron determination, against his unknown ailment, refused all the assistance Lothan smoothly offered, ordered away all his assistant scientists who insisted that he should submit himself to a thorough examination. None the less, his assertion that he was really quite well began to carry less conviction. His external scales were drooping—a sure sign of bad condition. His breathing came with the sharp gasps of a man trying desperately to control pain.

Lothan made no comments, merely watched with a grim smile twisting his heavy lips, taking care, none the less, that his superior did not notice. When at length the instruments were assembled to Vaspus' satisfaction, Lothan stood back for further orders.

Vaspus waved a weak hand. "Summon the leaders," he ordered huskily. "There is not time for all to assemble. Something—something is wrong with me, Lothan. You were right."

"Master, if there is any way I can help you—"

"No—no, not now. Summon everybody, quickly! I—"

The master stopped, staggered a pace, clutched tenaciously to the mighty control board of his machinery. Then, without another sound, he pitched to the metal floor and lay still.

Only for an instant did Lothan stand gazing down at him, faceted eyes gleaming; then he lifted the ruler in his powerful arms and laid him on the long metal table against the wall. Turning, he snatched up the vibration communicator and summoned the leading medical and biological minds.

Within three minutes the experts

were present—immense and ugly creatures possessed of the keenest physiological minds on the planet. Lothan stood to one side as they examined the ruler with their complicated instruments, watched keenly every little reaction of their gauges and testing meters.

At length Umyas, the chief biologist, looked up. His face was set in an expression of profound amazement.

"Whatever it is that has overcome our beloved master, it is something beyond our ken," he muttered. "He is not dead—neither is he alive. The only course is for him to retire to his chamber, there to be watched and guarded until there is some development that will give us a clue."

Lothan nodded and quietly summoned two robot machines standing behind him. With gentle metal arms they lifted the unconscious ruler and bore him out of the laboratory, laid him down, at last, on his own cushioned air bed within his immense private chamber. As they performed the action, Vaspus stirred for a moment; his great eyes settled on Lothan's impassive face.

"Lothan—the machinery!" he breathed weakly. "If—if anything should happen to me you must demonstrate. You—you take command! But show the machine—"

"Later, master," Lothan replied quietly. "You will soon be with us again. It is your achievement, even though I understand it. I am not worthy to set in motion the creation of your mind."

Vaspus did not answer. His eyes closed again, and he relaxed gently. The assembled experts made motions amongst themselves, arranged about the bed the necessary automatic machinery that would attend to the stricken ruler's every need during their absence. Then, satisfied they had done all in their power, they darkened the room and departed. Lothan followed silently in their wake.

In the corridor, Umyas turned to him questioningly.

"This machinery the master speaks of? What is it?"

"A revolution in atomic science, Umyas," Lothan replied coolly. "With its aid the atomic universes can be seen; the worlds within them become clearly visible. For years, as you know, our revered ruler has labored to such an end. He was fortunate in that he defeated the illness long enough to finish his task. The machine waits—either for him or me."

"You mean?"

The adviser shrugged superciliously. "If the master should pass away—and it is ill that such words should have to pass my lips—I shall rule in his stead. He made that fact perfectly clear, I think."

Umyas did not answer. He had no regard for the quiet, sinister Lothan—never had had. Without another word, he turned and left, with his puzzled fellow specialists around him.

VASPUS, lying on his bed, was in a physical condition that utterly baffled his trained and resourceful brain, matured as it was, through decades, to face any problem and solve it almost immediately.

His condition was paradoxical in that his brain was unaffected. He was crystal-clear in perception; had never been clearer. The trouble lay in his body. It refused utterly to respond to his will, was seized in some ironically immovable paralysis that all his strength of mentality failed to break. So far as he could determine, his body energy was undergoing some strange and subtle change, was in the grip of something outside his own normal energy that had plunged him into a blur of pain.

Even to open his eyes was an enormous effort. He beheld only the darkened bedchamber. The slightly parted curtains revealed the Martian night

through the window, little Phobos coming into view ever and anon on its tireless wandering across the sky, casting its pale light on the attendant machines as they mechanically tended their master's every conceivable need, injected into his blood stream strong stimulants and pain-deadening sedatives. Normally they would have given him relief; this time, for some obscure reason, their powers were nonefficacious.

With a tremendous effort, Vaspus forced his eyes downward to look at himself. Had he not been so paralyzed he would have started with amazement; his body was bathed in lambent blue fire, lay in an aura of phosphorescence! Energy? Electricity? Chemical activity? Vaspus' mind postulated all three possibilities and came up against a blank wall. He did not know. Besides, this effort of keeping his eyelids open—He closed them wearily and relaxed.

Not ten minutes later the door of the room opened very softly, so softly the pain-deadened ruler failed to hear it. The harshly cut face of Itbos obtruded into the opening, painted with the glowing fire from the master's body. Almost instantly he retreated, fled through long, airy passages to the private domain of Lothan. He found the adviser seated at his desk, head sunken into his scaly paws in musing thought.

"Lothan! Lothan, come quickly! The master——" Itbos stopped, gulping for breath, waved a gesticulatory hand as Lothan gazed at him.

"Well, what of the master? Has he recovered, or is he dead?"

"Neither; I think he's—he's on fire! He is bathed in blue light. Lothan, what have you done to him? Don't you realize that if this act of yours is ever found out you'll be——"

"Quiet!" Lothan snarled, leaping up and flinging his powerful hand across his colleague's mouth. "You dotard! Do you want everybody to hear you?"

He stopped and withdrew his hand, smiled bitterly. "So the master's body glows, does it?"

"As blue as an energy tube!"

"Seeing that it *is* energy, that is not surprising," the adviser commented calmly. "Everything is working out exactly to plan, Ithos."

"But, Lothan, what have you *done*? Can't you tell me?"

Lothan sat down again, did not answer the question. Instead he asked one.

"Ithos, if the universe were suddenly flooded with energy from an external source, from some suprauniverse, exactly what do you imagine would happen?"

"Presumably it would be destroyed."

"Ordinarily, yes. But suppose there came into it an energy of the exact type needed to create life instead of destroy matter? Would not every piece of matter in the universe, every planet, every satellite, even every star, momentarily increase its energy as it absorbed the sudden influx? Naturally, it would—and in the process it is also quite conceivable that the universe would turn blue with electrical energy. That, my worried friend, is a simile of what is happening to our dear, beloved ruler!"

ITHOS gawped stupidly, stumbled over the strange theory the adviser had outlined.

"How *can* it?" he blurted out.

"Because inside of Vaspus, inside you, inside me—inside every being on this world or any other world, even inside the worlds themselves, are universes. Molecules, if you prefer—universes of the infinite small, but just the same—universes!"

"That is simple science, Lothan. Do you take me for a learner?"

"Candidly, yes." Lothan nodded cynically. "Every scientist in this planet, even Vaspus himself, missed the

main issue when this life-eternal system was promoted. Vaspus certainly couldn't create life out of inert chemicals; he admitted that much. But he could stop death. That also was quite true. What he forgot was that, by allowing himself to be bathed in that cosmical energy he gave life to living worlds inside his own body! They were not inert chemicals, such as those we tried to stir into life. They were electrons, worlds in miniature, all packed within the atoms and molecules comprising Vaspus' body. Very well, then. When he supplied cosmical energy and allowed it to surge through his body he gave to those electrons the energy of life, spawned upon them maybe living beings, beings of the microcosm.

"Maybe it only happened to one electron, one world—maybe it happened to thousands—that we don't know. It all depends upon the different states of the worlds concerned. What we do know is that Vaspus has probably brought life to worlds within himself, and in so doing has replaced his own bodily energy with cosmical energy, the full balance of which has taken some little time to show. Now it has come, it will inevitably mean his death."

"Why?"

"The people will demand it in their own interests."

Ithos looked puzzled. "I don't see that, Lothan. The people will never seek the death of our ruler."

"No?" Lothan smiled amusedly. "You will see for yourself before very long. Another thing: keep as far away from Vaspus as you can. Better still, I'll have the automatons erect an insulated screen around him. Then we had better summon the biologists and leading scientists. It is essential they see Vaspus in his present condition."

He rose to his feet and strode purposefully to the vibration communicator on the wall.

III.

BY MARTIAN DAWN every important member of the scientific council had been summoned, stood in an interested but puzzled group around the softly glowing ruler. But between him and them there now reposed a heavily insulated transparent screen, erected by the automatons.

Quietly, in tones of most abject despair, Lothan made clear the nature of the master's ailment, giving it purely as a theory, nor was he surprised at the storm of protest that greeted him.

"Life within life!" cried Umyas. "I refuse to credit it, Lothan."

"Even though you admit that we are made up of microcosmic universes?" the adviser asked calmly.

"Certainly! We failed to produce life in inert chemical by the cosmic energy; how, then, do you allow that it happened to our ruler? Is he not inert chemical just the same? Composed of electrons which are precisely identical to those in the inert material we tried to enliven?"

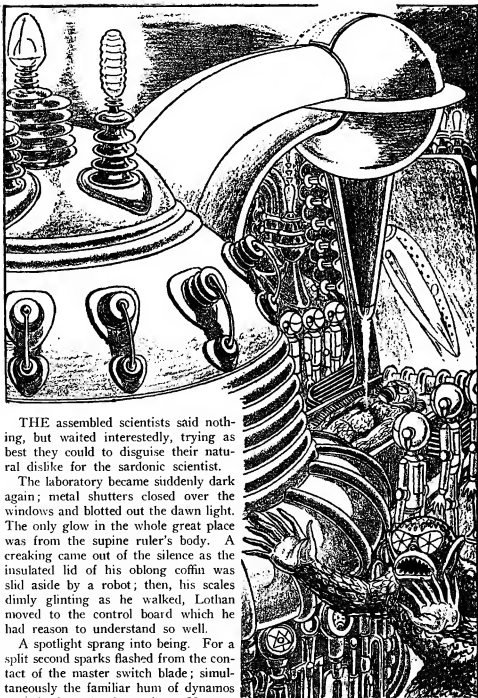
"No, Umyas, he is not. It surprises me that a biologist of your undoubted eminence should even think so. Between molecules in a state of life such as those within a living being and those in an inert chemical aggregate there is an infinite difference. Pressures are different; temperatures are different, and most of all they are within a *living* being which of himself imparts something of life to the electrons within him. When he let that cosmic energy surge through him he produced the same identical effect that happened to this universe when a similar surge must have spread through it from a supra-universal source, begetting such life as ours. Inside of himself he has repeated creation, and in the doing has lost his own life energy by replacing it with infinitely stronger cosmical energy."

"Then——" began Umyas dazedly, and stopped uncertainly.

"I will endeavor to prove it to you," Lothan remarked quickly, and turned to the ever-attentive automatons. "The robots will transport our master's body into the laboratory within his insulated case. It is purely a precaution against possible dangerous energy emanations proceeding from him that may affect us. In the laboratory we can learn, by the use of the atomic machine he himself constructed, whether my theory is correct. You agree?"

There was a slow nodding of scaly heads. Lothan smiled in satisfaction and stood aside as the automatons gently lifted the ruler and bore his screened case from the chamber, ultimately laying him down, under the adviser's direction, directly beneath the focus of the enormous atomic projector. Once that was done, Lothan switched on the ceiling lights and indicated the masses of inexplicable machinery.

"Only our beloved master and myself know the exact process adopted with this instrument," he announced superciliously. "That being, forgive me if I merely explain that it is based on the principle of every atom-emitting vibration which can be transformed, through devious methods, into a pictorial version of the object originally emitting the vibration. Just as our superreflectors reach out to the ends of the stellar universe and pick up the weak light vibrations of the farthest stars, pass them through transformers and reproduce by amplification a clear-cut picture of the original star, so here we do the same with atoms and the electrons within them. The result is projected onto the screen which you see immediately before you." He nodded to the twelve-foot square receptor near at hand, its surface at the moment composed of a metal as black as space itself.



THE assembled scientists said nothing, but waited interestedly, trying as best they could to disguise their natural dislike for the sardonic scientist.

The laboratory became suddenly dark again; metal shutters closed over the windows and blotted out the dawn light. The only glow in the whole great place was from the supine ruler's body. A creaking came out of the silence as the insulated lid of his oblong coffin was slid aside by a robot; then, his scales dimly glinting as he walked, Lothan moved to the control board which he had reason to understand so well.

A spotlight sprang into being. For a split second sparks flashed from the contact of the master switch blade; simultaneously the familiar hum of dynamos spread through the quiet. Vacuum tubes silently glowed into life; violet light sprayed from enormous condensers

"Look!" breathed Umyas unsteadily, pointing. "Look!"

and transformers. Little by little the noise increased; the surgings of power were stepped up until, at last, the entire laboratory was bathed in glowing, mauve flame, leaving the still unmoving ruler as a solitary figure in the direct path of the projection machine. At last there stabbed from its lens a carved, ivory-white pencil of blinding, heatless brilliance, striking his supine body and passing clean through it into the floor, then down again into seemingly dimensionless depths.

The Martians watched in deathly silence. Lothan himself stared fixedly, a strange lavender-painted figure before the switchboard, massive seven-fingered hand flashing up and down the complicated controls. There came a sudden deeper throbbing, an even greater mad crackling of incalculable power; then the broad screen changed from its jetty neutrality to a soft and delicate salmon pink. It deepened to scarlet; then, by imperceptible degrees, merged gradually toward violet, radiating a most bewildering but indescribably lovely array of colors in the process.

"Look!" breathed Uniyas unsteadily, pointing. "Look!"

His colleagues did not need the injunction; they were already gazing in amazement at the portion of their master's body revealed on the screen. Only for an instant was there visible the strange skeleton formation of his chest and ribs—a perfectly produced X-ray impression—then that changed and merged into a composite haze, as the bones themselves were penetrated, the great central breastbone becoming gradually wider until at last it filled all the screen. From that point onward the amazing penetration went through all the composition of the bone, revealed with a clearness never known before its actual constitution, laid bare the phosphate, carbonate, fluoride of lime and other materials, which, in turn, passed on into a common blur in which

there was nothing understandable.

Once this point was passed the violet glow vanished and was replaced by black. For what seemed an interminable length of time there was nothing visible; then, slowly, there merged into view tiny points of light, incredibly small galaxies of stars and suns, identical on a small scale to those in the vast, external universe.

"Watch!" commanded Lothan, and stepped up the amplifiers to an even greater pace.

THE LABORATORY became sickly in its heat; the air reeked of electric discharges and hung heavy with smoky exhausts. The metal floor quaked to the vibration of the thundering engines. Only the atomic mechanism itself remained steady, all traces of vibration overcome by Vaspus' final accomplishments; the light-tight reproducing chamber was functioning flawlessly.

The smallness of the microcosmic galaxies increased at a tremendous pace, leaped from mere dusty hazes to enormous agglomerations of countless suns and nebulae, rotating slowly in empty space.

"This is but one molecule within the body of our beloved ruler," Lothan commented quickly, but his voice was hardly audible above the din. "Think of it, my friends—one molecule! Therefore, inside him, there are untold millions of universes, each one of which has probably been imbued with life force. One universe is enough for our purpose, however. If he has indeed created life, it will be as evident in this one as in any of the others. Let us observe."

More switches clicked under Lothan's hands. In the screen there appeared a vision of a perfect solar system. Even as it swept into view the brilliant bluish-white sun changed to yellow and sank down to red. By the time the view

was clear the sun had altogether expired. Irritably, Lothan changed his switches again, and presently located another solar system. Here again the sun was slowly fading from white to golden yellow, but its deterioration was less swift than the preceding one.

"Why the change?" called Umyas.

"Time," the adviser answered curtly. "Time in the microcosmic universe moves with infinitely greater speed than our own. Remember that a thousand million years on an electron is but one millionth of a second on Mars. The sun in this particular system is of vast size and therefore takes longer to expire. Even now, though, it is dying. Even as we gaze, life on one of those electronic worlds has pursued its course from prehistoric days to the end of civilization. Surely on one of them there might be life—"

He stopped, jolted with sudden amazement. The Martians moved nearer as the view steadied, and stared down on the largest of the group of seven planets. Six of them were deserted, but on this major one there was something distinctly bright and gleaming spread upon the surface; the outlines of a city couched deep within the towering mountains of a rugged, friendless landscape. Even as they stared the city began to crumble with age.

"Intelligent life!" breathed Umyas. "The work of thinking beings! Lothan, you were right! It proves to us—"

He broke off, gazed blankly with his faceted eyes as there suddenly leaped upward from that strange, inexpressibly beautiful city a gleaming, silver machine, plunging outward from the slowly dying world into the depths of electronic space.

"Space travel!" breathed Lothan. "They are escaping from their world, doomed by eternal cold. See, already time is moving so swiftly that their planet is caked in ice—and yet the space machine is becoming larger, must be

covering intra-atomic space at a speed beyond compute. Larger— Larger it—"

He stopped, dumfounded, as the machine began to swallow up the entire cosmos, filled the screen with a common grayness.

Abruptly, the truth flooded in upon him; he shouted huskily.

"They are traveling to the end of their universe—intend to burst through it into the suprauniverse. *Our* universe!" he cried hoarsely. "Quickly! Stand back! There may be an explosion—"

He instantly deserted the switchboard, blundered away amongst his colleagues, went backward with them to the far wall. With startled eyes, they all watched the screen; it was an impalpable, swirling blur of gray. The engines went on thundering their song of power—

Then, abruptly, from the body of the silent ruler there was a flash of unbearably brilliant light; a sharp report followed, and that was all. The assembled scientists advanced again, cautiously, toward the insulated case. The master was unharmed save for a slight wound in his side from which there dripped a steady flow of brown blood.

"Quickly! Lights!" Lothan shouted to the automatons. "Lights!"

He went over to the control board and pulled out the switches, listened while the dynamos sang down the scale and became quiet. Even as they did so, light came into the laboratory—not from the bulbs, but from the windows, as the automatons threw back the shutters to the Martian day.

"LOOK," muttered Umyas, standing with the others around the case.

Lothan came to his side and peered within the oblong. In the strong daylight the bluish glow from Vaspus had almost disappeared. But it was not that that concerned the adviser; his eyes

were fixed on something he could scarcely believe—the sight of a microscopically small object of bright metal, reflecting the Sunlight: a machine of infinitesimal proportions, tapered at both ends, lying still now on the soft air bed whereon lay the obviously unconscious master.

"What—what is it?" demanded Ithos blankly, staring over Lothan's shoulder.

"A machine of the microcosm," the adviser muttered back. "Those beings we saw left their world, but instead of seeking another one in their own universe they took a far greater chance—decided to burst the bounds of their universe and gain the supra one—ours—beyond. They succeeded. It has done little to the master, save create a wound which can rapidly be healed, but it has brought to us life from a world within him, a life originally created by his cosmic-energy experiment. Now, my friends—he looked up with a triumphant sneer—"perhaps you believe my theory?"

The assembly nodded quickly.

"Will not others come?" questioned Umyas. "Of all the teeming universes within the master there is surely the possibility——"

"Certainly there is, but for the time being we will be satisfied with what we have."

"If there are beings inside that machine, why don't they appear?"

"We'll soon find out," Lothan answered, and, turning to the robots, he issued instructions.

Gently, they lifted the machine out of the case and placed it on a near-by bench. With further quick movements they applied healing ointments to the ruler's wound, cured it instantly, then slid the case lid back into position.

"The growth enlarger will settle our difficulty, I think," Lothan commented. Accordingly, the minute vessel was moved into an adjoining section of the laboratory, placed in the center of the

floor and there flooded with radiations which rapidly widened the electronic orbits of the ship and its contents, until it stood nearly one hundred feet high and three hundred feet long. Only then did Lothan switch off the machinery and wait expectantly.

Almost immediately the massive air lock of the vessel was mechanically unscrewed from within, swung aside in the grip of some form of magnetism. Through the opening there appeared men and women, so strange and bizarre that the Martians stared incredulously.

White-skinned people without scales! Possessing two legs each and two arms, these latter ending in five-fingered hands! For some reason that the Martians could not fathom the heads of these beings were not bald, but covered with peculiar fluffy substance, dark in some cases and fair in others—some long, some short. The eyes were the most remarkable, of various colors from black to blue or gray, and entirely without facets.

IN ABSOLUTE SILENCE, Lothan and his contemporaries watched the people file out into the great laboratory. Mentally, Lothan counted a full three hundred of them of all shapes and sizes, some clearly female, if their lesser size and more rounded development was any guide. Nor were any of them naked; instead they had on strange substances—one-piece white garments with a brightly gleaming belt about the middle. In size they were diminutive. Not one of them was more than six feet high. Lothan drew himself up, proud of his eight feet of height. He towered over the high-foreheaded little being who was obviously the leader of the party.

"Who are you?" he demanded curtly in his own language.

The little man shook his head, replied in an unknown tongue.

The Martian frowned and glanced at his colleagues.

"Obviously language difficulty," he grunted, and motioned the strangers back into the main laboratory. Once there he prepared to place them all in the range of a brain-tutoring machine, when, to his surprise, the leader spoke fluently in the Martian tongue. In dazed amazement Lothan turned to gaze at him, met the leader's inscrutable, calm black eyes.

"I am sorry, my friend, that I did not answer you immediately," he apologized quietly. "It took us some little time to assemble your particular language into understandable form. I am Razak, former master of the planet Disep. But I see you know already of the fate that threatened our home world. We knew that ultimately our planet would die and, knowing also that no other worlds in our universe were exactly suitable for our purpose, we decided to come from the microcosm to here.

"By some chance, it appears, our world was within your ruler Vaspus. I trust, my friend, that we have your hospitality? Here are my people and children, a chosen few—indeed the only ones who were willing to take the chance of breaking into the suprauniverse."

He indicated the men and women about him, and the wide-eyed children peeping nervously round their parents. Lothan stared at them blankly, turned back again to take in the details of the speaker—his high-domed forehead and, most particularly, those strange, unfaceted eyes, deep and unfathomable black pools that held within their depths a clear evidence of tremendous intellectual attainments.

With something of an effort the adviser found his voice.

"Why of course you are welcome to stay here until you put your affairs in order. Tell me, though, how did you defeat time in crossing from your world to this one?"

Razak smiled faintly. "Suspended animation, my friend, which set time at zero. Some day you may understand that condition. Our awakening was perfectly timed because we knew you would find us."

"Knew?"

"Certainly. There are no secrets in time or space when you understand them."

LOTHAN FROWNED darkly. "You understand, of course, that you may only remain on this planet until you discover another planet whereon to continue your activities? We of this world have no room for permanent strangers such as yourselves."

"At least you display the lack of courtesy common to the true scientist," Razak commented dryly. "It may perhaps interest you to know that we of Disep are intellectuals. We gained your clunisy machinery stage æons ago. When our world was dying we became masters of everything scientific. Our last achievement was the construction of the machine that brought us through interatomic space."

"I understand." Lothan nodded, but his great eyes were narrowed.

"I further understand from your mind that your ruler was really responsible for our being alive, by his use of cosmic energy. You realize, of course, that he is a deadly being to have on this world?"

"I imagined so," Lothan said. "Is it your concern?"

"In a way," Razak answered calmly. "You see, I happen to know that your main object in allowing your ruler to use cosmic rays was so that he would ultimately be deposed and allow you to rule in his stead."

At that Lothan moved slowly forward, suddenly shot out his immense hand and grasped the imperturbable Razak by his slender throat.

"So you read thoughts?" he asked with minacious softness. "You burst

into our world and the first thing you do is to poison the minds of my colleagues against me! We do not like such people as you, Razak. I was prepared to be tolerant until you straightened yourselves out; as it is I have no alternative but to imprison you until it is decided what we shall do with you. Maybe we'll set you to work. In any event, you will learn that, intellectual or otherwise, it does not pay to insult the future ruler of Mars. I am powerful. remember that!"

Razak shrugged his slim shoulders. "I only speak the truth, Lothan. Imprison us all if you wish; it will not matter."

"Not matter?" Lothan repeated suspiciously, releasing his hold on the man.

The little ruler did not explain himself further. Inwardly fuming, Lothan turned to his servants and gave swift orders. Then he watched grimly as the entire party of men, women and children were herded unceremoniously from the laboratory to the regions of the prisons below the city itself.

As he gained the doorway, Razak looked back. "Remember, my friend, that your king is a menace to all living beings so long as he remains on this planet. The life energy he has within him will communicate itself to other living beings once that screen is removed. He is neither dead nor alive, and will remain in that state until the cosmical life energy within him expends itself after innumerable centuries. Fire him into space away from this planet. Never allow him to touch anything that lives; never allow him to make contact with any planet again. Though he himself will die the instant he touches space, the energy within him will live on, being itself part of the cosmos."

"Are you daring to give me orders?" demanded Lothan savagely.

"No, I am merely warning you. Do not forget that recently you were near to him when the lid of his insulating

case was removed. So was your companion Ithos—as well as some of you others."

"Well?" Lothan demanded, but his tone had obviously changed.

"That is all. You'll learn more later. It is a pity your hospitality is so bad; you have much to learn yet of the ways of Razak of Disep."

With that the strange individual turned and followed his people, leaving Lothan and his colleagues staring dubiously after him.

IV.

THOUGH LOTHAN tried very hard to reassure himself that Razak's bald statements were merely empty vapors, he could not altogether shake off a grim conviction of dread, a feeling that the strange little being from the microcosm had known exactly what he was talking about. Once he felt inclined to visit the man and learn more, then refrained. He was a prisoner, awaiting judgment with his comrades for treasonable assertions. That, at least, was how Lothan looked at it.

Ithos was frankly afraid and admitted it. Umyas was quietly suspicious. Razak's remarks had not fallen on stony ground. Coupled with a natural dislike for the overbearing Lothan and the strange malady of the master, the biologist was inclined to believe that the intellectual from Disep knew exactly what was in the traitorous Martian's mind.

What Razak had meant by imprisonment meaning nothing to him had not so far become evident. He and his comrades languished deep in the bowels of the equatorial city, within a steel-lined cell, permitted only the tiniest orifice for air. Machines brought food once and it was promptly refused. The intellectuals of Disep never ate. By some curious process of synthesis and mind control they were able to live on air

alone, extracting its essences in a manner totally incomprehensible to the less intelligent men of Mars.

The night following the strange events in the laboratory Lothan found himself confronted with the frightened Ithos, his scales trembling with the obvious terror that possessed him.

"Lothan, I had to speak with you!" he panted. "I could not repose during the rest hour; I want to talk. Do you think the people suspect us?"

"Certainly not!" Lothan retorted coldly. "All along you have been a worry to me, Ithos—too jumpy, liable to betray everything in an unguarded moment. Calm yourself and leave everything to me. Our path is now entirely clear. We know that Vaspus will never recover, that the energy of life possessing him has destroyed his physical powers forever. Only his mind lives, and that will soon pass."

"You mean you are going to take Razak's advice and fire him into space?"

"I am taking nobody's advice but my own. Certainly Vaspus must be fired into space, an isolated wanderer; otherwise he will pollute us all. I admit that Razak has borne out my theory to a certain extent—that the energy radiating from Vaspus is dangerous. Therefore, he shall be sent into the void before dawn. I have decided on that."

"And the people? Will they permit it, do you think?"

Lothan's expression was one of infinite scorn. "Permit it!" he echoed. "It is not a question of permission when I am the virtual ruler of this planet. Nobody understands so much of the control of this world as I. I was Vaspus' chief adviser and acclaimed by him as successor—that is enough. Once I am actually in power I shall put into force the plans he always refused to execute. We will expand—conquer—master the far corners of the universe and

become controllers of the microcosm, too." He leaned forward tensely. "Do you not see, Ithos, what we can do? Razak brought a microship from the infinitely small. We will build other machines identical with it and so visit the atomic universes that surge about us. He has provided us with the one science we do not fully understand—intra-atomic travel. We have already conquered interstellar space. Yes, it is easy! There will come a time when this world will grow old; we shall need fresh fields in which to expand our activities. Maybe the third world in this system—"

Ithos nodded slowly, calmer now. "All that I am in agreement with, Lothan, but there is one thing that still worries me. Did being near the opened case of Vaspus have any effect on us? The words of Razak are still haunting me."

"Then dismiss them!" Lothan returned with supreme contempt. "Just a talkative, white-skinned fool from another world attempting to frighten us with so-called mind reading. There is nothing to fear!" He rose to his feet with sudden purpose. "It is a good time now to dispose of Vaspus' body. The others are at the rest period; by the time they awake Vaspus will be in space. Once that is done I am in control and can do exactly as I wish. Come!"

HE LED THE WAY swiftly from the chamber and down the darkened corridors of the great edifice. The quietness of the rest period was upon everything—three short hours in which the scientists of Mars recovered from their scientific labors—three short hours, too, before the Sun would again appear in the cloudless Martian sky.

Without a pause, Lothan led the way into the main laboratory and, Ithos beside him, softly closed the door. Vaspus' body was exactly where it had been dur-

ing the earlier events, still emitting its blue life-energy glow.

Lothan nodded contentedly and went on through the laboratory to the next great hall, switched on the lights and surveyed the colossal cannon device by which space machines were catapulted into space, afterward achieving continuous flight by means of the enormous initial momentum provided.

"Have the machines fetch Vaspus' body here," the adviser snapped. "I will prepare a projectile to receive him."

Ithos nodded and went swiftly off. With calm and unhurried movements Lothan operated the vast machinery, watched in silence as mechanical arms raised one of a series of two hundred small freight projectiles from the cradles by the far wall. His faceted eyes were glinting with the light of grim pleasure as he watched the tiny ovum swing in the enormous wilderness of machinery, lower gently to the floor and become still.

Swiftly he unscrewed its air lock, unbolted the trailer apparatus by which it was normally fastened to a passenger space machine; then he set the guiding controls. He was still checking the proposed route carefully on mathematical calculators as the automaton appeared and laid the glowing ruler's body within its insulated case on the floor of the machine.

Ithos waited in expectant silence, watched as his colleague made the final adjustments to the guiding mechanism.

"Elliptical orbit?" he asked quickly, and Lothan nodded grimly.

"Yes, with the Sun as the approximate center. This projectile will stay within the confines of the solar system, but will never touch any actual body, therefore there is no chance of this life energy every affecting any world, be it living or dead. The orbit I have charted will bring this projectile back within

this region, between this world and the third one, at intervals of seventy-six years or thereabouts."

Ithos nodded slowly and continued to watch as his determined colleague screwed up the air lock and then returned to his machinery. Slowly, the projectile was raised into the air again, dropped at last within the huge tunnel of the space gun. With a quick movement, Lothan set the automatic controls and moved rapidly toward the door.

"The observatory," he said quickly. "We can view what happens for ourselves. Hurry! The gun is timed to release in seventy-seven seconds."

At top speed, he and Lothan raced through the building, down the corridor that connected the laboratories with the astronomical rooms, and finally into the great observatory. Lothan slammed the door quickly behind him. Even as he did so the entire chamber, the whole vast edifice, quaked with the sudden force of a tremendous explosion. The gun had released its inconceivably powerful explosive, hurled the living-dead king of Mars into the eternal depths of space.

Only for a moment did Lothan hesitate, then he moved to the semicircular area wherein lay the floor reflector of the powerful space reflector. Impatiently, he operated the various controls required to its management, stood gripping the rail that surrounded the screen, waiting anxiously as the huge device moved and slid gently into position upon immense gimbals, finally automatically fixing itself into position and reflecting a clear area of space.

Lothan's breathing became labored with the strain of events. Ithos, beside him, gazed at the screen with eager eyes.

THEN, suddenly, there streaked into view a brilliant ball of bluish-white

light, bearing behind in an almost detached fashion a long, fan-shaped streamer of misty light, as elusive as a solar corona. Immediately the reflector responded to the light waves received from the object, held it steady on its outward journey into space.

"Is that it?" asked Ithos at length, in a puzzled voice.

"Of course it is! The movement through space has broken up the original ship and Vaspus into vaporized, extremely tenuous gas, given visibility only by the life energy which Vaspus carried with him. That of itself is indestructible. The farther that thing goes into space, the longer the tail part will become, may spread out by common attraction to a distance of millions of miles." Lothan stopped and pondered, staring hard at the nucleus of the odd-looking object. "Already the central portion is expanding rapidly," he went on. "As it travels it will become larger—maybe as large as this world, even more. And every seventy-six years it will return, a silent witness to our master's endless journey. Never again will that life energy touch any world; my calculations have seen to that. But we have seen enough! Come."

He turned away and prepared to leave the observatory, then stopped in amazement as the door quietly opened. Within it Razak of Disep stood framed, and behind him his own people, together with a tremendous number of Martians—Umyas, the biologist, at the front. Only for an instant was Lothan at a loss. Then he strode forward grimly—only to stop again as Razak commanded him to halt.

"You—you dare to order me!" Lothan burst out furiously. "What are you doing here? How did you escape from the prison?"

Once more he advanced purposefully, slowly came to a halt as his eyes met

those of the little Disepian leader. Once again he read in those dark, unfathomable depths a strength of will far in excess of his own. He gazed stupidly, presently looked round to find Ithos, scales quivering, immediately behind him.

Umyas pushed his way through the Martians in front of him and faced Lothan from a respectful distance.

"Fortunately, Lothan, I placed a good deal of faith in the observations Razak made when he first arrived here," he said grimly. "It was I who released him and his people. We arrived at the precise moment of the firing of the space gun. You have, of course, hurled our beloved ruler into the void?"

"What else?" the adviser sneered. "Would you prefer that we all be killed by the energy he was emanating? Razak himself advised such a move."

"We all know that," Umyas retorted. "For that we bear no malice; our beloved master has been released from a living death. What we cannot forgive is the fact that you permitted him to make the experiment knowing full well what would come of it. You did it purposely, in order to gain the mastery of this planet. I suspected it, but I had no proof. Thanks to Razak my suspicions were confirmed. A man created on a world within our ruler, who otherwise would have been unborn, has arrived to upset your entire scheme. It would have been better had you not dabbled, Lothan."

The insolent Martian did not answer for the moment, but his face set in an expression of ugly fury.

"It is time you understood, Umyas, that I am the ruler of this planet and nothing can alter it!" he said.

Umyas smiled twistedly. "It is not left to me to alter it," he responded coldly. "Suppose you and Ithos look at yourselves!"

SIMULTANEOUSLY with the words, his hand depressed the light switch, swamped the great observatory in absolute dark. With fear crawling through their vitals, Lothan and Ithos stared down at themselves, then shouted hoarsely. They were glowing, dimly, with the first unmistakable traces of life energy!

"You see?" Umyas asked, flicking the lights on again. "Again Razak was correct when he foretold that the open lid of the insulated case would permit fatal radiations to reach you. Gradually the incipient energy within you will grow, become a gripping paralysis, your bodies mere hulks for the living, spawning universes within you.

"Now you realize why we are keeping our distance—why Razak ordered you to halt. Had you seen yourselves in the dark before this you would have realized the fate in store for you. There is only one course to adopt." Umyas' voice became grim. "In the interests of the planet you must follow Vaspus into space!"

A stunned, dead silence fell momentarily on the two Martians. Then Ithos screamed hoarsely.

"No—no, not that! Umyas, I never really meant to do this! It was Lothan who——"

"Stand exactly where you are!" Razak commanded, as the two of them moved forward. "Stand perfectly still! Umyas, summon your servants to seize these two. Immediately!"

The biologist obeyed, and only when the automatons were holding the two traitors in a grip of iron did Razak relax his overpowering will. He smiled faintly and enigmatically.

"I am sorry, my friends, that my first task on this planet should be to bring to justice so traitorous a scheme, but since chance willed it I have no alternative but to obey." He turned and faced

the assembled Martians. "I would suggest immediate dispatch of these men," he remarked, in his quiet and unassuming voice. "Delay will endanger all of us. Proceed at once, Umyas."

The biologist hesitated for the briefest fraction of a second, rather taken aback by the intellectual's calm order. Then he gave the necessary orders and a clear path was made for the fighting, struggling pair as they were driven by the relentless automatons to the projectile room. In silence, the Martians and Disepians followed at a distance in the rear. Umyas and his immediate followers got to work on the projectiles, calculating just as Lothan had done not an hour before.

Lothan became calmer as he watched. Such was his nature, absolute defeat revealed in him no trace of fear—only a proud and insolent arrogance against those who had proved cleverer than he. Ithos was different; his nerve had gone utterly. He stood muttering and panting to himself in the grip of the machines, half insane with fright.

Lothan moved his contemptuous eyes away from him and surveyed the ticking calculators; then he looked at the small figure of Razak in the immediate foreground. The intellectual's brows were down in concentrative effort, queer hypnotic eyes fixed on Umyas with a steady, unwavering stare. Suddenly and vividly the truth smote Lothan's agile brain.

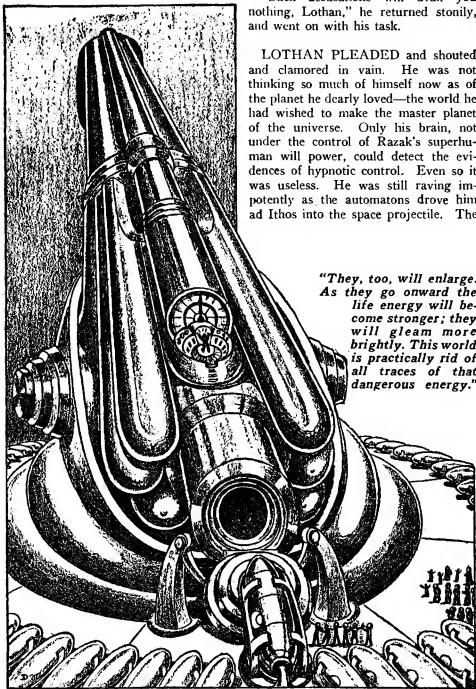
"Umyas!" he cried hoarsely. "Umyas! Don't you realize that Razak is hypnotizing you? You are not master of your own will!"

The biologist and his comrades looked up sharply from the calculators. Razak's face hardened from its normal expression of assurance—became fiendishly intense. For a brief moment Umyas seemed to recover a vestige of normalcy, then he shrugged.

"Such accusations will avail you nothing, Lothan," he returned stonily, and went on with his task.

LOTHAN PLEADED and shouted and clamored in vain. He was not thinking so much of himself now as of the planet he dearly loved—the world he had wished to make the master planet of the universe. Only his brain, not under the control of Razak's superhuman will power, could detect the evidences of hypnotic control. Even so it was useless. He was still raving impotently as the automatons drove him ad Ithos into the space projectile. The

"They, too, will enlarge. As they go onward the life energy will become stronger; they will gleam more brightly. This world is practically rid of all traces of that dangerous energy."



air lock closed and their shoutings were cut off.

Steadily, Umyas fixed the controls of the cannon, then departed with Razak and his colleagues to the observatory.

In silence, Martians and Disepians alike heard the titanic report of the space gun, saw in the reflector a bisected mass go hurtling into space, breaking into two separate balls of incandescence with sprawling tails expanding behind.

"They, too, will enlarge," murmured Razak. "As they go onward, the life energy will become stronger; they will gleam more brightly. This world is practically rid of all traces of that dangerous energy—but even yet there may be others. We of Disep have gained our end—have removed all traces of opposition and become masters of this planet!"

He turned slowly in the bright lights and faced the surprised Martians. His implacable face was one of frozen hardness, eyes bright and keen. Umyas took a sudden step back amongst his fellows, swept his startled, faceted eyes over the steady array of white faces, male and female, grinning with sardonic amusement. Little people, yes—weak and ineffectual, and yet their minds—

The words of Lothan swept back into Umyas' mind. Finding his breath with an effort, he gulped out, "Masters of this planet! What do you mean?"

"I mean that Lothan spoke the truth," answered Razak smoothly. "I did hypnotize you, but only to a good end. They deserved to die, those two—they *had* to die. Not only because of energy, but because of the opposition they might have caused me. Understand this, Umyas, I am the ruler of this planet and nothing you or your people can do will alter it."

"Then—then Lothan spoke the truth?"

"I mean that the law of the cosmos is survival of the fittest. We are more in-

telligent than you; we even forced you, mentally, to come and release us from the prison. We have no world on which to live save this one; therefore, we will take it from this moment onward."

Umyas' startled eyes swept the slowly nodding heads of the Disepian men and women. Three hundred of them, themselves almost approaching the inhuman mentality of Razak. The Martian suddenly felt utterly helpless, wished he still had the determined, even though traitorous, Lothan beside him. At least he was his own kin, not a white-skinned being of pitiless intellect. He turned weakly to his fellows and read in their faceted eyes a hopeless despair.

V.

RAZAK OF DISEP clung immovably to the purpose he had outlined. With effortless ease he wrested all semblances of control from the Martians, even fired several more into space as they revealed unexpected traces of life energy, until, at length, he was satisfied the blight was completely eliminated. Umyas he promptly dispatched to the twin city at the north pole, there to work in comparative exile.

The Disepians rapidly turned the Martian machines and devices to their own uses, mastered the planet from end to end. But to a mind like Razak's that did not represent completeness. His insatiable desire for further achievement, that same restless curiosity that had led him to drive himself and fellows into this suprauniverse, allowed him no rest. He realized the universe about him opened up immense possibilities for expansion.

He examined each of the surrounding planets in turn and found them impracticable. The nearest to the Sun was a blistered wilderness on one side and a frozen sepulcher on the other. The next nearest was still too young for con-

sideration. The giant outer planets, too, were in the same state. But in the third world there lay opportunity. Night after night he sat beside the vast reflector with his two scientific assistants, studying every detail of the third world, watching the writhing of its clouds and the phantasmal visions of a tumbling landscape beneath—cruel and rugged terrain being molded out of the formless into a world of dawning shape.

"An empty world, young and fresh," he murmured broodingly, and his assistants nodded. "A world without life, without greenery, without even the faintest spark of a living amoeba. There, my friends, lies room for expansion. There are three hundred of us. One hundred and fifty will depart forthwith for that world and commence the generation of a race. I will go personally and direct operations. You, Vildon, will stay here and take over control. You will find it simple enough now that these Martians are under subjection."

Vildon inclined his head. "As you wish, Razak. Clearly, within several cycles that third world will be well populated. Our race can expand and live as never before, once the seed of life is taken to it."

Razak nodded slowly, his eyes thoughtful. "We will take seeds from this world—plant seeds—cover that young and barren world with beauty such as our own world of Disep once possessed. Our readings have shown that that third planet is suitable for us in everything except gravitation. That is rather in excess of normal, but no matter. You will give orders for space machines to be prepared for departure at Sundown to-morrow. Within an hour you will receive tabulated lists of those whom I shall choose to accompany me. Now you may both go."

The two departed, left their superior gazing musingly into the reflector.

"To that world shall come life," he

muttered. "Life from a world within a world. The power of long-dead Disep shall be felt throughout the length and breadth of this suprauniverse."

THERE WAS one thing, however, that the implacable Razak overlooked in his anxiety during the hours preceding the departure of the ten space machines to the third world. During those hours, while he arranged for the ships to be fully provided, together with new high-power disintegrators for the leveling of mountainous terrain, the intellectual sway he held over the Martians was removed; his whole concentration and that of his fellows was trained on the difficulties and trials of the last hours.

In consequence, Umyas arose, with his fellows at Polar City, from the depths of a semimental stupor, realized clearly for the first time the tremendous dominance Razak and his fellows had been holding over them.

Reference to the television machines soon placed them in possession of the facts as to what Razak was planning to do. Immediately Umyas went into conference with his fellows and from the conference emerged a plan, a possible scheme whereby to overcome the deputizing Vildon once Razak had departed into space.

Umyas acted immediately. In the five short hours he had left to him whilst the Disepians were in the projectile laboratories, he got an army of automats to work, formerly doing only the tasks planned for them by the white skins. Following the biologist's directions they drove fast machines to the four corners of the planet, disintegrating beams in the base of their fliers gouging vast chasms in the landscape as they went, soundlessly cleaving mountains and plateaus alike, forming about the uninhabited parts of the planet a veritable network of 1,000-foot-deep valleys, all leading back to within two

miles of the shores of the principal oceans grouped about the opposite poles of the planet.

In all, the automatons took three hours to accomplish their noiseless purpose, scored the Martian disk with regular parallel lines in all directions from the sea defenses, ending the channels at five miles distance from the mighty equatorial city wherein the interlopers were now watching Razak's departure for the third world.

The Sun had been set some little time; darkness enveloped the planet. Before long Phobos would be above the horizon. This very fact of darkness, as Umyas had hoped, served to prevent Razak from observing the changed appearance of the planet's disk, nor was his mind trained on Umyas, for he had all his mentality still directed on the successful maneuvers of the fleet into space.

Umyas, from his Polar City laboratory, surrounded by as many of his fellows as the place would hold, was smiling grimly. His massive hand twitched over a series of buttons and switches.

"Interlopers!" he breathed vengefully. "Razak has departed into space; that leaves only Vildon and his immediate contemporaries. They seek to master our planet, do they? Here under my hands lies a series of remote-control explosive switches. Whilst one sector of automatons carved chasms from the oceans to the chief city, another sector laid depth charges of space-gun explosive at the shore end of each channel. I am told the work is finished and the wiring is connected.

"Once I depress these buttons every channel at the sea end will explode, permit the twin oceans of opposite poles to deluge inward to the center—will utterly overwhelm and destroy the Disepians before they can do a thing to help themselves. Some of our own people will go, too—that is unavoidable. The point is that we shall be left with Polar

City, fully equipped—ready to start again. If Razak ever dares to return with his fleet we will destroy them all before they ever reach this planet. Later we will destroy him on his third world and be rid of him forever. Is that clear?"

The assembled Martians nodded, eyes gleaming brightly with triumph. Umyas smiled grimly, depressed the multiple switches, then stood back. Almost instantly the entire bulk of Mars quaked and trembled to the force of titanic concussions. The explosive tore out the remaining barriers between channels and oceans. Inconceivable volumes of water belched inward along the given tracks—an inevitable, smashing deluge that reached the equatorial city and crashed in upon it from all four sides.

Vildon, about to take over the control Razak had assigned to him, received warning too late. Before he or his fellows could make a move the flood was upon them. It crushed them to pieces in the tumbled ruins of the city, drove their remains deep down into swirling vortices of brine, stone and metal.

In an hour the entire face of Mars had changed. Slowly, gradually, the spent oceans started to reform themselves, thundering in raging torrents through the specially made channels that left only the poles high and dry, the northern one containing the exulting Martians.

"We win!" breathed Umyas, staring into the televisior that gave him a view of the ocean where the equatorial city had lain. "The Disepians have been destroyed! Our task now is to rebuild and chart the land. Once the oceans have established a new level and position we can start again."

IN HIS triumphant decision, however, Umyas had reckoned without Razak himself. The Disepian ruler, once

Sunlight came to the red planet, saw immediately what had happened, realized suddenly why his efforts to get into touch with Vildon over the spatial radio had met with no response.

His expression scarcely changed as he stared down; only his lips set into a thin, bitter line of hate. About him his colleagues burst into cries of dismay, stared unbelieving into the reflecting screens.

"Razak, what's happened?" demanded Cralo, his immediate attendant.

"Is it not obvious?" the ruler asked coldly. "Those Martian scientists at Polar City played a swift move that has utterly defeated Vildon. Umyas is responsible for this. He has destroyed the city by diverting the polar oceans. Our control over that planet is at an end."

"We can return at once and reassert ourselves!"

"No." Razak shook his head slowly. "You may take it for granted that if we tried to return, Umyas would be on the lookout for us—would destroy us completely. In Polar City he has all the devices necessary. I was a fool to send him there—an even bigger fool to forget to hold him under my will during the last hours. Umyas remains to build a new world—or so he imagines," he concluded softly. "It occurs to me that we placed in these space ships disintegrators similar to his own, for the purpose of mountain leveling."

"You mean——" asked Cralo eagerly.

"I mean that at our present slight distance from Mars we can use them very effectually. Umyas shall not succeed; I will destroy him first. Give orders to the remainder of the fleet to train their disintegrators on the planet and to stand by for my firing order. We will see whether these fool Martians are so clever after all. Hurry!"

The attendant immediately obeyed.

Razak waited through a short interval, during which the distance from Mars slightly increased. His face was set and hard as he received the information that every weapon was ready. The thought of allowing the victorious Martians to remodel the world they had recaptured never occurred to him; only the idea of extinction gained access to his ruthless brain.

"Fire!" he commanded into the inter-spatial transmitter, and the order was incontinently relayed to all other nine ships.

Simultaneously, the entire battery of ten disintegrators released their powers, trained exactly on the red globe some 100,000 miles distant. Calculated to be dead correct by mathematical machines, the terrific force struck the planet's surface, instantly blasted Polar City into dust, scooped out great craters in the ground beneath it. The seas boiled furiously, evaporated in enormous clouds of steam and spume, left under their banked clouds of vapor great barren areas of new and sodden continent. Time and time again the disintegrators struck the planet, each time the recoil sending the ships farther away into space, until, at last, Razak gave the order to stop and stood looking down on the receding planet with a grim smile.

"A lifeless world," he murmured. "A pity in some ways and yet very necessary in others. A lifeless and now waterless world, carrying the eternal mark of Umyas' short-lived victory in the shape of those still visible chasms stretched across the disk like a network." He turned abruptly. "Set the course back on a direct line with the third world; recoil has turned us aside. Proceed afterward as already instructed."

WITHIN 200 hours the Disepian fleet finally landed on the surface of the

third world, settled gently down on the soft, lushy soil of that very young planet, upon an immense plateau washed by the foaming breakers of a tempestuous sea. Overhead there lay the densely heavy clouds begotten of eternal warmth and moisture.

"A world of great possibilities," commented Razak, staring out through the window over the wilderness. "Everything except gravitation is suitable for us." He drew a deep breath with an effort. "That is one problem that our science cannot altogether overcome. Here on this plateau we will erect our principal city."

The others nodded slowly and stared at the distant end of the plateau, where the waters of the incessant atmospheric downpour had come together in foaming torrents, already cleaving vast gorges in the upflung mountain range.

"It will be a long time before this world becomes really climatically suitable," commented Cralo doubtfully. "Do you think that it is wise to stay, Razak, or had we perhaps better journey—"

"To another world?" Razak interrupted him. "How do you propose we do that? We know all the other worlds of this system are useless. Mars, too, is no longer of use now we have blasted all the water from its face. No, we might wander through all eternity and never again find a world such as this. As ages go by it will settle down and become a lovely world. We will conquer it as we have conquered everything else. And we will name it—Earth!"

ACCORDINGLY, by the untiring efforts of the scientists of Disep, there began the first colonization and control of the new world—a wild and terrible world in those early days, all but defeating their untiring diligence and labor. By degrees, with the aid of their scientific instruments, they were able to

direct the immense rain clouds to areas where they could precipitate their moisture harmlessly. They gained for themselves a slowly drying landscape already flourishing with the germinated seeds that had been laid in the soft, warm soil. Trees and shrubs began to flourish in the enervating air, mothered by the vital chemicals of a planet still in its cradle.

The erection of a city was a tougher problem, but the determination of Razak to establish himself on the planet would accept no defeat. Little by little, braced against the tempests that almost constantly swept the planet, the city began to appear—composed of synthetic stone and gradually supplied with all the necessities of life. Slowly, inevitably, Razak was gaining his ends.

During the ten years occupied in building the city, his colleagues discovered many things, notably the formation of the planet they were on. So far as could be judged their city was erected on a vast plateau of land existing between two enormous continents, ice-bound to the north with the manifest approach of a glacial age. Nor was the plateau in a very secure position. The ocean, still in the throes of tempestuous upheavals, revealed distinct signs that it might ultimately sweep inward between the two continents and engulf the city in its depths.

TO THIS possibility Razak paid surprisingly little attention. He had other problems on his mind. One was the exuberance of growth occurring on the plateau; the enormously fast germination and spread of plants and trees was worrying him. In every direction, save in the ice regions, there were vast jungles of interlacing green, sodden and crawling with a new form of small life, protoplasmic slime that he knew inevitably spelt the dawn of a beast age,

destined to evolve through the ages into wild animals.

But that was not all. His principal worry was his increasing inability to concentrate or understand his own scientific machinery! It was a trouble that had spread to all his men and women and to the children of those whom he had ordered to mate. For some reason they were losing their grip.

Of the fifty couples who had mated and borne children, each child revealed distinctly atavistic tendencies, was far less intelligent than the parents themselves. Razak began to feel the grim portents of an impending Nemesis catching him up on this young, horrible planet spawning now with life.

It was typical of him that the trouble lasted for months before he finally condescended to notice it. Then he went into a close study of the problem and finally summoned all his people, children included, in the main room of the powerful, weather-insulated city.

"My friends," he said steadily, looking round on their obviously degenerate faces, "we are faced with the profound problem of fading intelligence. I see it in your faces; you see it in mine. Our achievements are crumbling about our ears. We hardly understand our science any longer. I have at least managed to solve the mystery, but there is no cure for it. You have all known how for these ten years we have labored unceasingly against gravitation, that one terrific power we cannot overcome.

"Pathologically, as you know, the blood stream is entirely responsible for the condition of the brain. A poor blood stream begets a poor brain, and a good one produces brilliance. On our own microcosmic world of Disep the gravitation was normal for our bodies—even as it was on Mars. The atmosphere, too, was correct. Here the atmosphere is filled with unexpected toxics, in many

cases from the rampant growths we ourselves started. The gravitation pulls perpetually on our blood stream and prevents an easy flow to the brain. We struggle in the midst of incongruous conditions for which there must be a price. One is inevitably molded to environment. Atavism, mental and physical, has set in. It means the doom of our science; that much we must realize. Maybe it is retribution for the destruction of Mars' rightful inhabitants."

"But can we not leave this planet and find another?" demanded one of the men.

"We could, but as we said before it is doubtful if it would be of any advantage. It would mean constant traveling through space, deprivation of essentials of atmosphere, living in a tiny world for unnumbered years. Besides, our numbers are greater now. There are children; there will be children's children—the very nucleus of a mighty race to come. Little by little they will atavise to a final point and become almost like the brutal, apelike beings that were the ancestors of our own race; then evolution will take its course and they will gradually ascend the ladder again, molded by the new environment, able to be happy in this world by the process of adaption. Finally, they will become intelligent thinkers; but throughout their life on this world they will never equal our own past brilliance. This world will not give that."

"THEN—then our race is ended?" demanded another.

Razak nodded sadly. "Ended in one phase, but just commencing in another. We know that this city cannot stand much longer against the mad storms that rage and fume over this world; ultimately it will be sent to the very bottom of the ocean that is seeking to sunder the two continents. We must scatter to

all parts of this planet, live as best we can on the rank fruits these trees of ours bear. The art of consuming nourishment from the air is now unhappily a lost one. We must forget all this. Some of us may last long enough with our devices to build cities in other lands to keep science alive for a while. But finally fate will catch up. Our children's children will be cavemen and women, seeking escape from the cold that is to come. Our city will be at the bottom of the ocean——"

Razak paused and mused. "Strange indeed," he muttered. "Future man will find our remains and not know that he himself had us for ancestors—will invent reasons for life on his planet, invent reasons for the three giant comet-like objects that will appear at recurrent intervals in the heavens, all unaware that it is the life energy of the projected men of Mars still circling their eternal orbits. He will ponder on lost civilizations, on the markings of Mars and its waterless surface, upon, perhaps, strange ruins in far-off lands. It would, perhaps, have been better had we never dabbled."

He looked through the broad window at the raging ocean so near the plateau's eroding coast line.

"Will even wonder if a city lies be-

neath the sea," he concluded musingly. Then, with a shrug, he drew himself up, became the commander again.

"We scatter—and part, with our children," he announced. "Come!"

Silently, the men, women and children followed him to the exterior. Under his directions they formed into a star with eight radiating points, then set off in eight different directions, bearing with them small mechanical devices for the possible construction of future habitats.

Some went toward the northern continent, some to the southern, others toward the mountains and still others toward the jungles. And as they went the ocean thundered and raged on the solitary plateau, strove with life-crawling brine to reach the deserted stone city, indescribably lovely amidst the tumult that had so long eluded it.

Only once did Razak look back, a silent and lonely figure in the lashing wind. His eyes took in the whole panorama—the far-distant vision of his men, women and children vanishing in the coming dark.

"To the future!" he muttered. "Some day man may understand——"

Then he turned and strode steadily into the night that yawned before him.



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Suddenly Matthews came to life. There was a way to end this mystery. It was the way of science. He raised the hammer—



*The Mystery remains—
—ageless as time itself—*

Within the Pyramid

by R. DeWitt Miller

GARVIN MATTHEWS, of the International Anthropological Society, stared unbelievably at the giant white pyramid poised on top of the sheer ridge. It seemed utterly unreal. The fading sunlight gleamed on

the pure-white sandstone of its sides, making it stand out in sharp contrast to the dark green of the Yucatan jungle which struggled for a foothold on the sides of the ridge.

Somehow Matthews couldn't forc-

himself to believe that it was man-made. But those sure, straight lines were not the chance of nature. It must have been built by human beings. But how—and why?

Black clouds, forerunners of a storm, drifted slowly behind the apex of the pyramid. The daylight was dying rapidly. He shook himself free from the spell of unreality and turned to the old man beside him.

"This will be the greatest scientific discovery of the century," he said. "When I make my report the society will immediately equip an expedition to make a thorough exploration."

Professor Phinias Hexter shifted uneasily.

"It's really not so large," he declared. "It's the first impression that makes it seem huge."

"Don't be foolish," Matthews replied. "I've done some work in Egypt. This thing makes the Great Pyramid of Cheops seem like a dwarf."

Hexter glanced at the tenuous arms of the black clouds which were gradually blending into a single dark curtain.

"It will storm in a few minutes," he said. "Don't you think we'd better wait until to-morrow to get a closer view?"

"Not on your life. I'm going to get inside that thing to-night—that is, if there's an entrance."

"Yes," Hexter replied slowly, "there is. But it's on the other side. It will be dark by the time we reach it."

Matthews glanced at him sharply.

"What's wrong with you? You act as if you're afraid of the thing."

"No," Hexter muttered, "not afraid. I've seen that pyramid too long to be afraid of it. It's what it stands for that has—"

His voice dropped into silence.

"I think you'd better do all you can to aid my expedition," Matthews said meaningly. "Remember, I don't have to tell the world what you've done—if I don't want to."

"Whether you tell them or not is of no consequence to me."

Matthews looked wonderingly at the gaunt, sun-bitten old professor.

"Why did you keep quiet?" he asked suddenly. "You've known of the existence of this pyramid for years—and you've told no one. This is the toughest place to get to on the American continents. There isn't a chance of seeing the thing unless you get into this valley. It's only visible from above. Do you realize that if I hadn't happened to stumble on it, it might have been centuries before it was found?"

"One century more will be long enough."

"I don't know what you're talking about—and I don't much care. What I want to know is why you didn't tell the world of your discovery—and what you're doing camping here alone?"

"As to the first question," Hexter said quietly, "I don't care to answer it now. As to the second, I am here to make explorations, just as you are."

"But you are connected with no society?"

"Does a man have to be connected with a society to be a scientist? I had an idea when I first saw this pyramid. It's an idea that's been in the back of my mind ever since I started archaeology thirty years ago. On my first exploration here I found enough evidence to indicate that I might be right. It has taken ten years and five trips to prove it."

"What is your theory?"

"I think facts will be more potent than my arguments."

"Then let's get on. What's the best way to reach it?"

"You're determined to go to-night?"

"Certainly. What did you expect me to do?"

"Yes," Hexter said half to himself.

"I suppose I would have done the same thing at your age. Have you a carbide lamp?"

"Two of them."

"Good. If you'll follow me, I'll bring you to the entrance in fifteen minutes."

WHEN they came close to the side of the pyramid, Matthews was stunned by the sheer immensity of the thing. As they walked parallel to the wall he studied the construction. It was unbelievable. The blocks fitted with the precision of the finest Egyptian workmanship. Only these blocks made those of the Egyptian pyramids seem puny.

Halfway along the farther side, Hexter stopped and pointed to a barely discernible set of steps in the stonework.

"These lead to the entrance of the tunnel," he said.

They climbed steadily for perhaps a hundred feet. Here the steps widened out into a broad ledge. In front of them was the entrance of a passage, slightly higher and wider than a man, which led into the heart of the pyramid.

"Something similar to the Egyptian pyramids," Matthews murmured.

"They were little copies," Hexter said. "The idea was handed down from this one, an almost universal legend of the days when *they* were alive."

"Who do you mean by 'they'?"

"Later," Hexter muttered, "later. First we will go to the conventional burial chamber."

Taking one of the carbide lamps, he led the way into the passage. Matthews lighted the second lamp and followed.

The passage ran level for a distance; then it slanted sharply upward. There was a damp, musty smell, the stale odor of things long forgotten and unused.

Suddenly the dark walls about them receded. Matthews realized that they had entered a small room. He held his light above his head. The room was perhaps twenty feet square. It was lined with hard, pink sandstone blocks, so beautifully fitted together that his eyes could scarcely make out the joints.

In the center, on a raised dais, were

four elaborately carved sarcophagi.

With a sudden cry, Matthews stepped forward and struggled to lift the lid of the nearest sarcophagus.

"You will be disappointed," Hexter said. But he helped wrench off the massive stone slab.

The blue-white flame of the lamp cast long shadows into the open sarcophagus. By looking closely, Matthews could make out a few bits of what might once have worn human form. Some whitened pieces of bones, several odd bits of metal, and something resembling fabric, which fell to dust at his touch.

With a curse of disappointment he turned away.

"The others are the same," Hexter said. "That was their masterpiece. No one would ever look farther than this room. It is all so perfectly obvious. It was the legend of the gigantic burial place which was carried over into Egypt."

"Hexter," Matthews said harshly, "are you going to quit talking nonsense and help me get the lids off the rest of these boxes? Or am I going to have to wring whatever you know about this place out of that scrawny neck of yours?"

FOR A MOMENT the old man did not answer. His lamp, held below his face, made his features seem grotesque. Finally he shrugged wearily.

"You are determined to report this find?" he asked.

"Of course."

"Then a great expedition will be sent. This whole place will be gone over almost with a microscope, in hopes of finding secret passageways. Finally the tourists will come."

"And why not? What are you afraid of? Are you a scientist or an old woman?"

Again Hexter did not answer for a moment. At last he seemed to reach a decision.

"I'm trusting you," he said slowly. "After all, you are a man of science. You have a good brain. If, after I am through, you decide to go on with your original plan, there is no way I can stop you."

"Well, if you are going to show me something, get at it."

"Not yet." Hexter sat down on one of the unopened sarcophagi. "I would like to ask you a few questions."

"What is this? A game?" Matthews said sarcastically.

"Perhaps—but it is my game. And in the end I promise to show you something that will change your whole conception of the history of the Earth."

Matthews sat down on another sarcophagus.

"All right," he said, "but don't be too long."

"You're an Egyptologist," Hexter began slowly. "Didn't you ever wonder what was back of the old civilization, and what it was that we keep seeing dimly in the legends and folklore of all people?"

"No."

"Well, I suppose you wouldn't. One has to blast his mind out of its conventional ideas before he can ever conceive the truth. But when you get the key, it all fits together. First, let's suppose that thousands of years ago, when man was still only half civilized, the Earth was visited by creatures from another world."

"Shall we tell ghost stories now?"

Hexter ignored the remark.

"I am merely making a hypothesis," he said, "just part of my little game. But to continue—say that some astral body similar to the Earth chanced to pass near our planet. That would account for the floods in all legends, and for the seven days of darkness in Egyptian and Jewish writings?"

"It might."

"It's more than guesswork," Hexter declared. "You must have heard of

Kobal's theory, based on the eccentricities in the orbits of Neptune and Pluto, that there is a body with about the specific gravity of the Earth which pursues an orbit similar to a comet."

"I've read something about it."

"Very well. Say further that intelligent beings on this astral body sent an expedition to the Earth. Perhaps their world was running out of natural resources, or it was overcrowded. Whatever the reason, certain brave members of their race decided to make the attempt to establish a new home."

"I wish you'd get to the point," Matthews said wearily.

Hexter paid no attention.

"Perhaps," he continued, "after the expedition reached the Earth, they discovered that its climate was incompatible with their type of life. They took a gamble, and they lost. Some essential element—perhaps a gas in the atmosphere or a necessary part of their food—was lacking. Even spectroscope analysis leaves you pretty much in the dark as to the true conditions on another planet. Say, for argument, that such a state of affairs occurred and you, Matthews, were a member of the expedition, what would you do?"

MATTHEWS looked away at an inscription in Mayan on the wall of the room, but he seemed slightly more interested in the conversation.

"Die," he said after a moment. "What else would there be to do?"

"Nothing—unless. Even our crude science has practically succeeded in producing artificially suspended animation. A more advanced science should be able to do that, shouldn't it?"

"It's possible."

"I'm glad you admit that much. At least, you must grant that it's an interesting hypothesis. Let us follow it through for a moment. Say you could suspend your life—by the use of some

anæsthetic—indeinitely, what would you do then?"

"I'd suspend it and wait. At least it would be better than simply dying."

"Not only that. It may be that my hypothetical expedition had some definite reason to hope that if they could suspend their lives long enough, there would be a chance to escape. But passing over that possibility—before you suspended your life, what would you do?"

"I'd arrange to protect my body so that it would be still in existence if a

expedition landed, man hadn't yet built anything large enough to be seen far out in space. Therefore it would be necessary to prove that your expedition hadn't perished immediately."

"I suppose so."

"I know so. There is one thing nature does not create: a straight line. A gigantic pyramid, placed on a bare ridge, would stand out as an eternal proof of the existence of intelligent beings. No other form or architecture so completely demonstrates the existence of a guiding mind. A pyramid is all straight lines."

Next Month:

WATER FOR MARS

A novel of unusual power in which a man harnesses supernal forces to a planet

by ROSS ROCKLYNNE

chance ever occurred for me to resume normal life."

"Then if you had access to super-science by which you could build a greater structure than any which puny man can create, you would construct a giant edifice that would protect your body during the dormant period."

"It at least sounds logical—which is more than I can say for most of your ideas."

"All right—there is only one more step. If you still had hope that the people of your world might send another expedition after you, it would be necessary to make sure that they knew you had been successful in living for at least a time on Earth. Remember, the inhabitants of this other world probably wouldn't believe there was any intelligent life on Earth. At the time their

"A most interesting theory," Matthews said with a short laugh, "but how about the facts?"

"That," Hexter declared, "is the next step."

He crossed the room, made a swift computation, and selected one of the giant stone blocks. He threw his weight against it. Noiselessly it slipped inward.

"A piece of balance that our science cannot duplicate," he said simply. "The concealment is marvelous, too. It took me months to find it."

The block had completely vanished now. The passage it revealed was smaller than the one by which they had entered the pyramid.

AGAIN Hexter led the way. The passage descended endlessly. Matthews calculated that they must have reached a

point below the surface of the ground when the passage broadened into a room. It was slightly larger than the burial chamber, but there was none of the ornamentation. There were no inscriptions on the walls.

In the center of the room were four caskets. They gleamed dully in the flickering light. Apparently they were composed of some metal, but it was not one with which Matthews was familiar.

"You see there are the same number as in the room above," Hexter said. "That was their great deception. Several beings existed for a short while on Earth. While they were alive they built a giant burial chamber.

"Then these four other-world people apparently died. One or two must have remained active to arrange the thing. Anyway, four bodies were solemnly buried in the upper chamber. But they were really human beings, killed, and disguised to resemble the other race. After a few years in this climate no one could tell the difference anyway. They would look no further than that upper burial chamber. The whole thing became a religion. It was a burial cult when it reached Egypt."

But Garvin Matthews did not hear. He was staring into one of the caskets. His mind was struggling with the thing that he saw. It didn't square with reason. It was utterly alien to every conception he had ever known—and yet it was there.

The casket was covered by a transparent material resembling glass—and yet not glass. Lying within the cushioned interior was the nude body of a young woman.

But the ghostly calm of death was not on the chiseled, aquiline features.

She was merely sleeping there. Death seemed completely apart from this lovely creature.

Slowly another idea was fighting its way into his mind. That strange pastel tint which suffused her skin! It was a

light, delicate green—not the ghastly hue of death. Somehow it seemed natural to her, as natural as the pink flush of human skin.

"Notice the hands," Hexter said softly.

Again Matthew's mind refused at first to admit the idea. Finally it broke through.

Each of the slim, delicate hands had six fingers!

"You see," Hexter said softly, "not of this world——"

And suddenly Matthews came to life. There was a way to end this mystery. It was the way of science. He jerked loose the heavy geologist hammer that swung from his belt, raised it above his head.

With a quick movement Hexter grasped his upraised arm. There was a remarkable strength in the frail body of the old professor.

"Not yet," he said. "There is one thing more to show you. After that, if you wish to break open the caskets, it is your affair."

Slowly Matthews lowered the hammer.

"What difference will it make?" he asked.

"Those caskets were sealed for a purpose. They were meant to be opened only by scientists of their own race. Before you decide to do anything, let's go back to the upper chamber."

"How do I know you will show me the secret of the sliding block?" he asked.

"I will leave the stone displaced," Hexter said quietly. "But first look in the other caskets."

MATTHEWS went slowly to each of the three metal coffins. Each contained a body—sleeping—but not the sleep of death. There was another young woman and two young men.

When Matthews had finished his observations, Hexter led the way back

through the passageway to the outer room. He pointed to the Mayan inscription.

"You can skim over it," he said, "except the last line. Of course, they wrote in the language of the country."

Matthews deciphered it quickly, keeping an eye on the open passageway to the inner chamber. The inscription was a conventional curse, calling down the wrath of the gods on whoever should desecrate the tomb.

"The last line," Hexter repeated.

Matthews read the line, read it again, a queer look on his face.

"But there's something wrong," he said. "The old boys must have made some mistake. There's a date in this last line—but it is still in the future. It seems to be the date when the curse ends. According to our calendar, it would be 2040."

Hexter spoke with slow emphasis, each syllable distinct.

"If this astral body or planet does pursue some sort of elongated orbit about the Sun, it will come back some time—say in 2040."

"What do you mean?"

There was a queer, soft note in Hexter's voice.

"Don't you have any admiration for these people? Think of them refusing to accept fate, struggling against the cos-

mos for a chance to live. It took supreme intelligence to figure it all out—and it took faith to lie down quietly in those caskets, in the forlorn hope that they would be safe through thousands of years. How about the ones that stayed outside to seal the caskets, and tend to the burial? They died calmly that others might live. Do you want to wreck it all now—less than a hundred years from the date they are waiting for?"

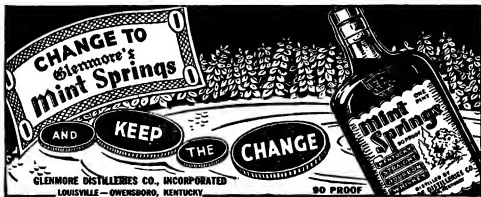
Matthews did not look at Hexter. He stared at the Mayan inscription—but he did not see it.

Hexter spoke again, but this time his voice was hard, driving.

"What if the creatures who built this pyramid, that makes our modern buildings seem like doll houses, should come back and find those caskets broken open, and the members of their ill-fated expedition dead and in our museums? It would not be well for man and his civilization in that hour."

There was silence in that room of the dummy dead. The dank smell of age-old things seemed a tangible presence. Faintly from outside came the roar of the storm which had broken over the Yucatan jungle.

Matthews' face was hard, like old, weather-stained ivory. His breath was short, gasping. At last he said, "I shall report, but—I will omit the pyramid."



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DESERT CITY

Which concerns a golden people more ancient than the desert—on which they live unknown—in the midst of a teeming earth.

JIM MOORHILL had jockeyed planes from one end of the country to the other. There was little under the head of flying he had not tried. At times living came easy; at other times—he hardly lived.

One of the tough periods was in full swing. For days Jim had wondered where his next meal was coming from; but, so far, had always managed to meet a friend at mealtime. Thus he met a stranger—George Bent.

There was nothing unusual in the meeting. Jim was hunting a meal ticket. George Bent proved to be a good one. It was during their third dinner together that George suddenly asked: "You wouldn't, by any chance, be looking for a job? I've hesitated to ask."

For the first time in months, Jim was embarrassed. He had told, as a personal experience, every high-flung tale he could recall.

"I'm stumped, George," he said. "I've been trading my stories for your meals. I thought the stories were good, but—I can darn well use any kind of a job."

Two days later Jim boarded a boat for Arabia to join an expedition into the desert. It meant liberal pay for several months. He had excellent accommodations and hoped to have a good time. He was heading out to find a man lost for months. Jim Moorhill was to spend his time in the air, carrying on the search from a base camp.

TWO MONTHS LATER Jim took a biplane up into the oven-hot air of the Arabian Desert. A week passed un-

eventfully, with a flight over a different sector each day. But no sign of life disturbed the monotony of sand and waste.

The ninth day Jim circled farther from the base. It was peculiar, droning alone over a waste of sand that looked and sounded almost like a tropic sea! The heat waves tended to hypnotize a man into an unnatural sleep. Jim Moorhill didn't fall asleep, but he did forget to be alert. And so, unawares and without warning, the storm caught him and tossed his ship into a maelstrom of heaving wind and sand that destroyed his directions and his compass in thirty seconds!

There came a blast of desert heat that lifted him upward like a bouncing kite. The plane spun and whirled, making the controls as useless and ineffectual as if they did not exist. Jim clung to his seat as a gust of cold wind caught the plane and lifted it again—or—and the thought choked him worse than the sand itself—carried him downward. He didn't know which, because he did not know whether the ship itself was riding right-side up!

Wind, rain, hail, sleet, cold gusts, ovenlike blasts, spirals—and all the caprices might be sweeping him at a hundred-mile-an-hour pace toward the open sea—or toward the interior. Visibility scarcely reached to the prop, yet he knew it continued to spin. How the motor had held free of the driving sand he did not know, but it droned on evenly. Even above the shrieking of

by WARNER VAN LORNE



For a moment she struggled, then stopped and looked at him. Surprise was so evident in her face that Jim wondered if this were the first time she had ever been stopped from following a mad impulse.

the wind he heard it and it was comforting.

Caught in the vortex of a twister, Jim tried to climb with it above the heart of the storm area. Every strut and guy-wire moaned with a soft crescendo of

destructive vibration. Ten minutes passed; fifteen, thirty, forty-five.

There came a sudden rift in the wind, a calm which broke through wind and cloud alike to show a momentary glimpse of earth ten thousand feet

below. Jim dived like a shot before the rift closed in above him. He saw the earth, and more. Rimmed in the desert he was certain he caught the vision of a walled city appearing wraithlike through the slashing clouds of sand!

Panic seized him at last. So far as he knew, so far as the Arabs professed to know, there was no settled, human habitation within a hundred miles in any direction. Had the storm— Such speed was impossible, and yet, there it was. He brushed his goggles and looked again.

The storm was leaving him behind. There was still a ninety-mile gale, but it was a steady, sweeping aftermath of the maelstrom. Only now weakness assailed him. Jim knew he must put down somehow, somewhere.

Dimly, his mind recalled the Arab legends of a white city in the desert, inhabited by Djinnns. But no white man had ever seen it, and its existence had been laughed away. Perhaps, through weakness he was doomed to *real* adventure, for he was hopelessly lost without a compass.

The motor coughed once and again. Wind or no wind, he must sit down, and the only hope of safety would be in the shadow of those walls.

In a long glide, Jim rode the wind to a landing. Without power, she slid forward at one hundred and thirty, one hundred and twenty, one hundred and ten. She bounced, then rolled without slackening pace. A draft pulled as the wind pushed. Too late, he knew he must hop the wall. Too late! The dual force nullified the controls.

One arm protected his face as he crashed head-on. He heard the ensuing explosion, saw the flash of flame before blackness engulfed him.

MANY HOURS LATER Jim Moorhill opened his eyes to feel the sting of antiseptics, even before his sense of smell recorded its surrounding

presence. A prickly, yet not unpleasant, sensation seemed to engulf his body. A vague feeling that all was not well seeped into his numbed brain—yet he felt no pain.

His eyes focused slowly on the men who bent above him, busy with oddly formed scalpels and surgical instruments. Had he been fully conscious he would doubtless have moved, and that would have been fatal.

But a puzzled light crept into his eyes, for these men were of translucent gold! It almost seemed as if he could look right through their bodies. Yet they were men in form, grave, classic-featured, and one of them, noting the expression in his eyes, smiled down reassuringly.

Golden flesh! These men were of no race known on earth! The city of the Djinnns!

Was he— Had they changed him? Jim's head rested on some sort of pillow. He glanced downward—a sweeping glance that packed a thousand horrible impressions into a fraction of a second.

His body was strapped tightly to the table—what was left of his body! It was still normal flesh, but only the trunk remained intact. And that the doctors—they must be doctors!—were incising and readjusting.

In a tank to the right he saw his legs, immersed in some amber solution. The stumps of the thighs were toward him, and he could see the ends of the veins, still full of blood which seemed to be held cataleptically in position. One of his arms was similarly resting in a jar of liquid at his left.

The doctors proceeded with their incisions, yet there was not a quiver of pain, and no blood flowed!

One swift glance registered these and many other, minor impressions. It required only the briefest instant in time, yet even as his eyes registered the truth, consciousness left him and he sank back into a merciful oblivion.

SLOWLY, Jim Moorhill's eyes opened. There was a sense of the long passage of time in the recesses of his brain as he aroused. Memories of golden-bodied men bending above him, remained. His eyes became aware that the same men encircled him now, talking softly in their strange tongue, fingers moving swiftly, surely, over his flesh.

Horror gripped him afresh as he remembered his last waking impressions. Involuntarily, his eyes moved downward. His right leg was in place! And even as he looked they moved the left leg into position, sealing it with some magic fluid and holding it gently, until, as the seconds passed, he could feel the blood flow coursing once more through the veins! And pulsing through the arteries! Faint, white scars showed where incisions had been made across his torso, but even as he watched these seemed to fade away, healing as fast as he could think.

Now and again one of the surgeons brushed an amber fluid across his skin, leaving behind it a warm sensation of renewing strength.

There was feeling in every inch of his body, but not the slightest sensation of pain from the amputations or knitting tissues. Both arms were again in place, though Jim would have sworn he had seen them in a tank of amber fluid on his first awakening. To his amazement, he found that he could move his finger tips!

Jim felt a sudden desire to awaken from what was certainly a horrible delirium, but straps held him tight. Even at the slight movement of his fingers, one of the strangers moved forward, caught his eye and shook his head negatively. Evidently the mad dream must go on. His fevered eyes watched as the tissues of his severed leg caught, held, and healed before his eyes—but he lay still.

After what seemed a dreary hour, the

surgeons removed the straps and lifted him tenderly. A few steps away they lowered him into a tank of liquid, keeping his head free. They motioned him, earnestly, to remain quiescent; and Jim's brain struggled helplessly to free itself from the grizzly nightmare.

He felt normal, as if he could climb out of the tank and go on living as he had for the last twenty-seven years. But he must not antagonize these men, dream figures though they seemed to be. After having experienced the operation he feared what they might be able to do if aroused. Or had they performed it? Was he dreaming, only to awake in a few minutes?

The golden men seemed real enough as they stood watching him. But they appeared more interested in the success of the operation than in him personally, and he felt chagrined.

The warm, glowing sensation of well-being affected him from head to foot now. Time seemed to drag, while translucent golden men watched every reaction of his body. Jim would have liked to watch, too, but they kept his head still.

At last he was lifted from the tank and, to his surprise, he was stood upright on his feet! *He could stand!* His body seemed to be entirely whole again. Or was he dreaming?

A pile of torn, bloody clothing—his flying togs—on the floor snapped him into full consciousness. From their appearance he had been battered pretty badly.

Questions rose in his mind to bother him. These people didn't understand English. He tried French and Spanish, but they shook their heads. The words they uttered to each other were strange, yet they smiled and appeared friendly enough.

Still, his body was flesh and blood, while theirs was of some cloudy translucency which the eye could almost—but not quite—penetrate.

One handed him clothes, simple garments like their own: a pair of tight-fitting pants with an overcape which hung from one shoulder. The right shoulder and side remained bare almost to the waist, where the cape was caught together. He felt momentarily strange in the outlandish garb, but was suddenly elated as he remembered how freely and easily he had moved his body in donning it!

FROM the operating room he was led through a long, dark passage. But at its terminus they stepped out into desert sunshine. The sudden glare blinded him for a moment, then his vision cleared, and he gasped at the sight of vast gardens in full bloom, stretching in a gigantic circle about what appeared to be a hole in the surface of the city floor.

There were scores of the golden people in the gardens, women as well as men. The women wore simple gowns slipped over their heads. The length and coloring of these varied conventionally as if designating a station in life.

Jim observed carefully as he walked. His brain recorded details of architectural planning, of gardening, of the physiological characteristics of the populace. He had completely forgotten the fact that he had been off from the operating table for less than an hour.

He noticed that his strange companions observed him closely and became gradually aware that they were probing his mind, reading his thoughts as easily as he himself would have perused a book! Their very brains seemed to have been tuned in on his.

He stood, at last, by the inner edge of the rows of buildings facing toward the huge pit in the center of the city which seemed identical in construction in every direction. It was round, built with the hole as its geometrical heart. There was a border garden two hundred feet wide around the pit itself,

several rows of buildings circling around the gardens inside the walls.

The buildings varied in size, but none was over five stories. Some were decorated with beautiful, sculptured friezes, but the big majority were plain. Only one type of stone was in evidence, a kind of white marble, very beautiful in itself but lending no variety of color.

The city wall stood well above the tops of the buildings. It was visible from where Jim stood, across the tops of the buildings on the opposite side of the pit. The ground directly before him sloped gently toward the edge of the opening, as if it had gradually washed down to form a terrace.

His companions led him through narrow passages between the buildings, until the party reached the towering, outer wall. Here Jim halted, awed by the very grandeur of what seemed to him the most amazing feat of engineering he had ever beheld. Of polished white marble, the wall rose some sixty feet into the air. Its inside surface appeared to his dazzled gaze to be as smooth as glass. Great stones—some of them ten feet high and twelve feet long—made up its face.

At intervals of perhaps ten feet, zig-zagging to the top, were tiny apertures in the facing, like windows, as if passageways penetrated the inner masonry.

But the party moved on, to a gateway in the wall. They entered it and moved along a dim corridor thirty-five feet in length, to emerge on the outer side of the wall. Close by rested the wreckage of the biplane, a twisted mass of fused and shattered metal. Jim tried to visualize himself in the battered, twisted cockpit—shuddered, closed his eyes, and turned away.

THE HEAT of the desert sun reflected from the outer wall was terrific, and perspiration burst from every pore in Jim's body. He noticed that the

golden men seemed not to be affected. Then he noticed another thing; *his* shadow was dense and black against the sand, while the shadows cast by his companions were slight, as if the majority of the sun's rays passed through their bodies unimpeded!

They smiled and nodded at him as the thought came, as if to say his interpretation had been correct.

To the left of the wreck, golden men were laboring in fields. Rich, fertile areas were covered by truck gardens and grain fields. Some of the crops appeared familiar, but many were of strange foliage. Food for the city was being grown here in the heart of the desert! Huge pipe lines carried water to the fields. While Jim watched he saw a man turn a valve in one line, and throw a spray over a whole section of near-by garden.

Beyond the cultivated ground, cattle and sheep were grazing on rich pasture land, watered by shallow irrigation ditches. The fields seemed to be fenced, but in the distance, in the bright rays of the sun he could not be sure.

Once more inside the wall, Jim was conducted to the very edge of the huge crater which centered the city. A thousand feet below his feet, crystal-clear water formed a lake which filled the pit from side to side. A thousand feet below! It fascinated him, held him. A sudden desire to dive into its cool, glistening depths seized him.

But even as the thought came, a hand rested on his shoulder. It broke the spell, and Jim looked up into the troubled eyes of a golden man who, Jim sensed, had read his thought.

A few steps back from the rim the party entered a stairway leading downward, and seemingly winding endlessly around the rim of the pit. The darkness of the stairs, the gradual curve, made the great size of the lake and crater more apparent. The golden men carried only crude torches to relieve

the darkness, and this also tended to add to the impression of great distances.

One hundred steps below the surface they turned aside into a short tunnel which ended in a tiny room. The door closed, and instantly there came a sense of motion. The room was an elevator, and it was descending. Minutes passed before it stopped, but when they at last emerged, Jim found himself on the shore of the lake at the bottom of the crater.

And beneath the surface of the lake, how deep it was hard to judge, he could make out the irregular surfaces of what appeared to be a gigantic meteor! What tremendous velocity must be represented by the force which would sink a meteor twelve hundred or more feet into the earth? The very thought of colossal forces made Jim's head swim. It was stupendous!

Every path and stairway in the pit showed signs of great antiquity. Ages had passed since the great mass had bored its way into the desert. The trail around the rim of the lake was worn into the solid rock. The steps of the stairway were worn in grooves from the tread of countless thousands of feet. What terrific toil must have been involved in boring upward to the surface of the earth before even the first step was taken to build the city and its fertile, farm-land oasis!

Golden people were rowing on the lake in small boats of peculiar design, and even the boats appeared ancient. Some were fishing for sport, apparently. Others were working on businesslike nets.

JIM was kept for a month in a small room overlooking the lake, with a man whose name sounded like "Zulin" for company. Zulin seemed to have a proprietary interest in Jim. He served as tutor as well as companion, cramming his protégé's mind with a new language.

Jim was treated kindly and fed well, but it became apparent that he would not again be permitted to leave the room until he was able to converse in the language of the golden people. Having resigned himself to this fact, Jim set to work with a will, to master the elementary vocabulary of these strange benefactors. Zulin was a careful and thorough tutor. He worked with *objects* at first, then with *motions* for verbs, and Jim followed well. Inside of three weeks simple conversations were possible. On the thirtieth day Zulin undertook to explain, and Jim understood.

"White man," Zulin said, gazing across the lake as he spoke, "you are the first of your race we have seen. We knew of no people on this planet with the knowledge you possess. You are advanced. Those who have previously neared the city are not.

"You are the greatest experiment we have ever attempted. Before now, when wanderers approached, we blanked accurate memories and substituted fear of this area. Thus we have been left undisturbed.

"Once, many years ago, an apparently civilized group wandered close, lost and starving. None lived to be questioned except one infant, a female. We have raised her to womanhood, taught her all our science. She could tell nothing of her origin, but appears as you do. We would say she is of your race, save that her hair is of a different color."

Jim started. He realized suddenly that the hair of all these golden folk was of an identical golden hue. To them, apparently any difference in coloring represented a racial division—even the hair!

This girl Zulin mentioned must be white! The thought quickened his pulse. He was alien to these people, but perhaps this adopted girl might serve to bridge the rift. A longing for

his own kind had been growing during his benevolent confinement.

Zulin was watching him with a half smile, and Jim felt a sense of irritation at having his most private thoughts read openly.

"The girl," Zulin said softly, "is the reason you are alive. If it were not that we feel she needs a mate you would not have been repaired.

"Repair work on your body proved very simple, though had we been too late to preserve your blood we could have done nothing. We had no source from which to procure more. Our greatest work is surgery, for it requires the finest skill in all the universe to perform even the slightest operation on one of our people. This is due to a condition of earth atmosphere. Our blood will not congeal, but continues to flow from even the slightest cut or bruise. So we have worked for a thousand years to perfect our surgery.

"We decided the girl, Beta, must have a mate. So you live. Our young men may not mate with her, because our bodies contain certain elements which would be disastrous to your people. You have noticed what is, to you, peculiar qualities in our structure. We are alien to this earth. We landed here by accident many generations ago—so many that our past is dimmed by antiquity.

"The huge meteor which lies beneath the lake was once a space ship bearing thousands of my ancestors across the void. What caused its collision with earth I do not know, but some survived. We had not known atmosphere with more than a fractional density to this one. Our ship would have stood firm in rarer air but the friction of your oxygen caused disaster. The controls overheated and there was no way to stop.

"You have seen the result. Blessedly, the pit broke open an underground river which has enabled us to live safely

through a thousand generations.

"The child, Beta, first taught us that there were civilized races extant. But we decided not to venture out. Our written records were destroyed in the crash. What we know comes by word of mouth, but the planet of our origin is a secret which died on the sealed lips of our ancestors. They must have had reason to keep it so.

"So we have burrowed our way to the surface. We have built a city with the metal from our space ship. We have found sufficient oil for our purposes of melting piping and small tools.

"When you arrived the discussion revived as to contacting your peoples. But the thoughts we traced through your brain, of wars, and bickerings, and famines, changed our minds. There is, aboard the ship, enough of a soft metal held in high esteem by your people to make one nation very rich. They would make war for our treasure. Yet we have no use for it. It is soft, and we have been unable to harden it for use as piping."

Jim, when Zulin paused, sat thinking deeply. Much that he said about the outside world was true. His mind turned to the girl Zulin had mentioned as the reason for his being alive. Their idea of mating him with a girl he hadn't even seen as yet was out! But perhaps they had not consulted the girl either?

Zulin was frowning slightly, puzzled. The golden men had given Jim his life for a purpose, yet he wasn't satisfied. It *was* puzzling.

"Your race is odd, white man. Even so, you resemble the girl. She was angered when we announced to her that we had procured her a mate. She says she wishes to choose her own mate, or have none! Perhaps we should not have repaired you.

"But come, you must see her and know for yourself that she is desirable. Our repairs have made you a better-appearing man than before, and it is to

be hoped she approves. If she wants you—you will become her mate. You have no choice."

Jim was told to wait in an ornate room in a building above ground. Zulin departed. The air which swept the room was much better than that which hung over the deep-set lake. Jim got his first glimpse of the gardens in thirty days, and he suddenly realized that it was good to be alive.

AN ANGRY WOMAN'S VOICE issuing from the doorway brought Jim around. Zulin came hurrying into the room with a fuming girl striding behind him, belaboring him with words. Jim whistled in amazement.

The girl stopped short, a picture of confused fury for a moment. Then she advanced slowly and looked him over from head to foot as if he were some prize animal on display.

Jim watched with a frown, which slowly changed into a smile. Then he laughed aloud and she grew angry again, stamped her feet and punmeled him with little, futile fists. Jim continued to laugh while she stormed, a blue-eyed, black-haired fury, perfect of bodily contour, but spoiled as any brat of the city sidewalks.

The golden man was distressed. He seemed undecided what course to take, but the girl continued to hit Jim with her tiny fists, until he became weary of being punmeled.

"Do you try to beat up everybody you see?" he demanded, still smiling, but grabbing her arms and holding her impotent.

For a moment she struggled, then stopped and looked at him. Surprise was so evident in her face that Jim wondered if this were the first time she had ever been stopped from following a mad impulse. An instant later she burst into tears.

Jim released her. Zulin showed anger now, and started forward, but Jim

moved before him. The girl was as perfect an houri as Jim could dream. His heart played tricks every moment she was in the room.

The situation was dangerous. Zulin appeared to think she was hurt. Jim knew he'd made a mistake, with no logical corrective method save one. He stepped forward, took the girl in his arms and kissed her heartily.

Her surprise lasted until he released her. Even the golden man stood in open-mouthed astonishment. Beta stood a moment frowning slightly; then, to Jim's amazement, she stepped forward and tilted her face up toward his!

She had experienced her first kiss—and liked it! Jim was not slow to accept her invitation to repeat. He carried on until she wriggled out of his arms, suddenly shy! Zulin was so bewildered by the change that he stumbled over his own feet. A sudden dawning understanding came into his eyes, and he turned and tiptoed from the room with a smile on his face.

Beta had captivated Jim. He couldn't have left the city without her, even if it meant torture to remain. He respected her sudden shyness, and when she sat down in a corner of the settee, he dropped onto a stool by the window. Thus, in low tones, began their first heart-to-heart conversation.

An hour later the girl took Jim's hand and led him on a new tour of the buildings of the city, the only home she had ever known. There were eleven thousand inhabitants, and it seemed that the new lovers met them all! Beta smiled and nodded to all of them, and they, in turn, seemed pleased at her attention.

Beta introduced Jim to several of the older men as her mate. This brought a pleasant response from every one. The respect with which she was greeted brought an inquiry from him, and she replied quite simply, that, since she was

the only person in the city who could not possibly gain by favor, she had come to be the arbiter of all lovers' quarrels, marriage disagreements, and money arguments. There being no organized government, she arbitrarily named the council and limited it to the surgeons, thus doing away with strife for office. In short, she was a queen without the name! Her commands were obeyed as if she were a deity.

SINCE there could be no jealousy or striving for her hand, Jim Moorhill was made welcome. They would be joined by the simple rites of the community.

Such information as Jim had given of the outside world puckered Beta's brows. The more he stated of the wonders of civilization, the more she frowned. The golden people had given to Beta all the culture they could know or teach, and she was wise enough to feel that it ill-fitted her for a strange world. To Jim, their customs might seem quaint—but to Beta there was a reason for every one. She did not want to leave.

With the freedom which was now his, Jim satisfied his curiosity as to the mechanics of the water supply, of machinery which seemed simple but effective. Zulin conducted him through the underground works, explaining as he moved.

Water power was the only driving force. Even the elevator to the pit was driven by water pressure. A control within the car opened or closed a valve, binding or releasing water beneath a huge piston at the bottom of the shaft.

The stream which fed the lake had been tapped a mile away, at which point it rose considerably above the top of the shaft. The perfect balance of the water weight against the weight of the car intrigued Jim into hours of study.

Pumps, operated by this same pressure, sent water to the top of a well

above the lake. Holes cut through the rock formations carried the water on to the pipe lines and irrigation ditches, and even into the more modern of the buildings.

The space ship had sliced neatly through an underground river. It flowed into one side of the pit at the lake surface, and carried the overflow waters away on the opposite side.

There were many varieties of edible fish in the lake, washed in by the river. These furnished an important item of the food supply. People were employed at all times netting them. A metal mesh across the outlet channel stopped the danger of either loss of boats, or inhabitants, or fish!

Life, in general, was a simple affair, with none of the finer comforts of civilization, yet it crept into Jim's consciousness like a drug. He thought of going out into the world to bring back electrical equipment and implements, and books. There was an ample supply of gold in the hull of the space ship to purchase anything they could use, and the thought of electric lights was attractive.

The people went to bed with the dusk and stirred again only with the dawn. There was no movement of any kind through the city at night. When occasion required, they lighted crude oil torches, but there was little save an occasional illness to disturb the night in the city.

The temperature of the buildings was not unpleasantly hot after Jim became acclimated. Cool air drifted up from the lake below, keeping the atmosphere livable and moist. Slowly, the thought became fixed that it was best the city remain unknown to the outside world.

Civilization had given Jim much less

than he received here in peace, and courtesy and favor. Here he could be happy. With a woman he loved, he could forget what he had left behind.

He stood alone atop the high wall, gazing across the desert. He was a long way from all his former friends and associations. He did not even know in what direction that fatal storm had swept him, or where he was! Everything he had known before he came was off there somewhere, but he was satisfied. He did not want to go back. It never even occurred to him that men were even now scouring the desert, looking for his plane!

It was passing strange that he could live satisfied, without regret, in a fantastic new world. He wondered why it was; and all the time he knew. The golden men had a strange power of hypnosis. Dreamily, he thought they must have used this power on him. Their minds were strong. They could have forced any member of the human race to their will easily. They must have planted the desire to remain, to live content. Even the idea of going after new devices was strangely gone.

Jim did not care. With a smile, he turned back, down the dark stairway to the earth, then moved toward the center of the city.

Suddenly, he laughed aloud, a happy laugh. He had seen a young couple kissing awkwardly in the shadow of a pillar! Twice more during the short walk toward the pit he saw the same thing repeated, once in plain sight of scores of other golden folk.

He had inaugurated a new game and they were enjoying it!

Somewhere up ahead, in a sumptuous apartment, Beta was waiting. There was no other world.



*With the speed of desperation,
he stumbled on in a delirium of
pain and exhaustion—*

**A Powerful Novelette
by EANDO BINDER**

MANKIND has a strange faith that its career on Earth will endure for unthinkable ages—a belief that worldly dooms are fantastic conceptions formed by overimaginative minds. Not one person in a million ever

stops to think that there might be such a catastrophe. All are sure that the Sun will rise and set over an industrious world of humans, good and bad, for—oh, for millions of years.

Does mankind forget that only 50,000



DOLD-

*A gripping picture of man under the
influence of the Red Spot on Jupiter*

Life Disinherited

years ago there had been a devastating ice age, which veils from us to-day any knowledge of a previous civilization that also said, "The world will go on as it is for—oh, for millions of years"?

An ice age is only one of many other

possible holocausts. An appreciable change in the percentage of carbon dioxide in our atmosphere would precipitate new conditions of frightful magnitude. An overabundance of cosmic rays, perhaps shielded from us by the

mysterious Heavyside Layer, would undoubtedly wreak great havoc. A chance strain of Earth's crust, bringing into conjunction an ocean and the molten interior, would make our world writhe like a scalded cat.

There might be another sinking of Atlantis, a second deluge, a quirk of evolution that would give the insects heritage of Earth, an uncatalogued menace from space—any of a number of things. And any of these might wipe out mankind, partially or totally.

Mankind, so far as it knows, has been dominant on Earth for some 20,000 years. 20,000 years is a second in the timepiece of the cosmos. For 20,000 years the tremendous, mysterious forces in the universe have let us in peace to pursue our confident way.

What gives us the right to say that even to-morrow our doom is not at hand?

WALWIN HOFFMAN painted the gold-striped bass which were clustered in a small swarm outside the bathysphere's port window. But after a moment his swift brush strokes stopped. He frowned.

What was that curious red glow that suffused the water around him? It changed the gold to copper, the delicate green to a blotchy brown. And it intensified his scarlets to hideous, bloody-looking smears. He threw down his brush in disgust.

"Damn that red reflection," he said. He had noticed it for the past week, each day getting stronger and more bothersome.

"Finny!" he called up the air tube. "Finny, you snoring wretch——"

"I'm not sleeping, sir," came the answer. "Not to-day. I don't like that red color in the sky. I can't sleep while that's going on. I don't like it, sir."

Down below Walwin reflected a moment. Finny's voice had a distinct note

of uneasiness in it. "Haul me up, Finny," he ordered finally.

Up above on the huge raft, Finny pulled valiantly on the rope and raised the small bathysphere, which was just a little more than sea water in density. It came up faster than it ever had before. The round, upper side came up in the cutaway center of the raft. Finny anchored it there, after carefully coiling the double tube of thick rubber. Then he helped Walwin swing back the hatchway plate, which had been held shut by water pressure and a simple bolt lock on the inside.

Finny's face, usually bland, had a queer, scared look in it, accentuated by the odd effect of the red glow on his florid skin.

Walwin gazed up into the sky, squinting against the bright Sunlight. The red glow seemed to come from everywhere. It masked the blue of the sky; made it a deep, poisonous purple, and whatever the light touched was crimson. It was ominous, somehow.

Transferring his paintings to the launch, Walwin started the motor, while Finny pulled up the anchors at the four corners of the raft. The young artist put the engine in gear and, slowly, the whole outfit—raft, bathysphere, and Finny—was towed toward shore. They seemed to move in a sea of red ink.

An hour later they had tied the raft at their little private dock in a small landlocked bay, and made their way through a tree-shaded lane toward the large, dilapidated house that Walwin had chosen to live in.

Already disgruntled, Walwin swore eloquently when he found his car with two flat tires. One flat tire might not have stopped him. But *two* flat tires!

"Finny," said Walwin later, as the other came in with a jug of cool lemonade, "I saw you rolling your witches' bones this morning—don't deny it. What did they tell you—about this red glow thing?"

Finny looked at the artist solemnly. "I'm not superstitious, mind you, sir, but there's blood coming to the Earth! There's going to be a big war, or hurricane, or—or earthquake. Yes, sir."

He left, more solemn than Walwin had ever seen him in the two years he had been his personal valet and general handy man.

Walwin laughed. But somehow, all through the evening of brooding Moonlessness and scarlet darkness, he could not shake Finny's disquieting predictions from his mind. He started uneasily when, from the kitchen, he heard the soft tattoo of Finny's prophecy bones on the hard floor.

"To-morrow evening," Walwin promised himself, "I'll drive to town and find out——"

SEVEN MONTHS BEFORE, word had flashed around the civilized world that the Great Red Spot of Jupiter, observed for 105 years, had disappeared!

No one, it seems, had actually seen the Red Spot go. But one person, an amateur astronomer with a small, six-inch refractor, had been peering at the belted image of Jupiter and had seen the Red Spot bunch up like a bubble and slowly shift position across the planet's disk. He had then turned away from the lens, sure that sleeplessness and eyestrain were playing him tricks. He had not looked again till an hour later, to find the Red Spot gone entirely.

The officials of Yerkes Observatory, receiving his telegram, could not afford to ignore the startling message. The indefatigable amateurs seemed to see everything else first—new comets, novæ, etc.—so it was just possible——

The image of Jupiter shimmered there in the lens, belted and storm-ridden, *but without its Great Red Spot!* It had been there the night before, the hour before, but now it was gone! And in its place was a raging, swirling tempest

of cloudy gases, as the atmosphere of Jupiter filled the gap.

Yerkes flashed the word that ran around the world with almost the speed of light itself, by telephone, telegraph and radio. Immediately, every telescope on the night side of Earth at the time had swung its lens or mirror toward Jupiter. One and all they saw it was true. The Red Spot, undeniably, wasn't there!

That was a night long to be remembered. Newspaper offices became mad-houses. Radio programs were cut off abruptly to announce the amazing news. With true news instinct, every public news conveyance played the thing up till the masses were more excited about it than the astronomers themselves. Full-page pictures were printed of Jupiter, with huge, white Xs to show where the Red Spot *had* been. Inevitably, nonsense was printed by the mile, speculating as to what had happened up there on Jupiter, and comparing it to one of Earth's oceans suddenly rushing up and dancing away.

For a week the headline hurlers played the event up, till it died of sheer overnutrition. With a sudden and natural reaction, the public got sick of it, and the vanishing Red Spot slid from the front page to the back filler spots.

For almost 200 days it was forgotten by the public. Then one day the Red Spot jumped back into the headlines, but in a new, more significant way——

IN THE MEANTIME, the world of science had puzzled mightily over the phenomenon. Astronomers and physicists scratched their heads for an explanation. Speculation ran the gamut of plausibility and then expanded into the field of incredulity. The Great Red Spot, 30,000 miles long and 7,000 miles wide, and perhaps 1,000 miles deep, had disappeared from Jupiter, true—but *how?*

Three theories sprang up, and the scientists took sides, each to his own inclination. One was that the Red Spot had not left Jupiter at all, but had simply burst, like a pricked balloon, and diffused itself into the general atmosphere. The Red Spot had always been understood to be an area of violently turbulent storm gases, somehow disconnected from the rest of the planet's atmosphere.

The second theory was that the Red Spot had left Jupiter all right, but had then burst and diffused out in space, under stress of the planet's great gravitation. Almost as though Jupiter had been a sentient being and had cast off a boil or canker sore.

The third theory was that the Red Spot, attaining the escape velocity of forty miles per second, had left altogether. This theory gained the least adherents and was attacked most bitterly.

How could this gigantic bubble of heavy gas, at least as large as Earth in volume, break away from the powerful gravitation of Jupiter? It required a velocity of about 140,000 miles an hour to escape, and its only natural velocity—from rotation with the planet—was one fifth that. What gigantic force could have increased the Red Spot's speed fivefold and thus allowed it to break free of the planet?

And so the scientific world argued the matter for seven months, long after the public had forgotten even the jokes about it. And in the seven months, while the Earthlings bickered, the cosmos opened Act II of its stupendous drama.

And Act II was to be much shorter than Act I—a few days instead of seven months.

II.

JOHN APPLETON watched the overworked worker smooth the last square foot of fresh plaster.

"There you are," said the latter. "It's the first time in my life that I've plastered a room from ceiling to floor, but, mister, that's your affair."

The workman gathered up his implements, took the money handed him and left, grinning openly.

"All right," said Appleton, swinging around to his friend, "I suppose you think I'm crazy, too?"

The friend looked at him curiously. "Appleton, you're a good man, and reasonably sane, but when you go to having a room of your summer cabin completely plastered off——"

The rest was eloquently unvoiced.

Appleton spoke calmly, unembarrassed, "That's not all. I'm going to have this one window nailed shut and sealed off with putty. I'm going to have several square yards of leather handy to fit the door so it's air-tight. Lastly, I'm going to stock this room with food and water and—compressed oxygen."

"I see," said the friend, not surprised. "You're taking stock in certain wild stories that have gone about ever since the Red Spot of Jupiter vanished."

Appleton nodded. A writer of scientific articles for the upper half of the lay mind, and considered a mere dabbler in science, he saw, or thought he saw, a significance that escaped every one else. Not having his nose too close to the fundamentals, and possessed of a wide range of knowledge, he had looked over the whole situation, always scratching, with the writer's instinct, for something underneath.

Three months after the event of Jupiter's loss of its Red Spot he had struck something—and gasped. At the time the Red Spot had disappeared, Jupiter had been turned at a definite angle toward Earth—in the direction, in fact, of Earth's orbit. That meant—if the Red Spot *had* left Jupiter as a sort of planetoid—it would eventually reach Earth's orbit, depending on certain fac-

tors of relative speed. And a certain speed, one which was wholly feasible, would bring the object to Earth's orbit, when Earth was there at that spot!

A quick check-up showed that neither Mars nor any of the asteroids was in between. The Red Spot—if it were really plunging through space like a cannon ball—might conceivably collide with Earth!

When, a month before the Red Spot dramatically reappeared, he read of amateur astronomers' reports of a misty red ball approaching Earth, he was convinced in his own mind that the collision would occur. He wrote an article, suitably embellished with his own figures and speculations, announcing this astounding thing, but no one would accept or publish it, not even a newspaper.

He was not later dismayed to find out that the amateurs who had sighted the almost invisible ball of red mist had plotted a course that would take it far beyond, and never near, Earth. It was their figuring of the course of the red mist ball against his own figuring of its aim at the time of departure, and he preferred to accept the latter. These, naturally, were in error.

And so, although his figures and half proofs were all wrong, he *knew* it would happen. Knew it so positively that he was taking no chance of being caught unawares.

"Any day now," said Appleton to his friend, "the big telescopes are going to sight the ball of red mist which is approaching Earth. It won't be long after that, either, that it will grow and grow, fill the sky, and finally——"

But the friend did not wait to hear any more. His car roared away and down the highway. Appleton, left to himself, looked over the Upper Hudson unseeingly. His mind was picturing a gray-green ball hanging in space, toward which was speeding a world-sized globe

of heavy mist, crimson in the bright light of the Sun——

RED CLOUD APPROACHES EARTH!

This was the headline that blared forth its voiceless thunder, days in advance of the object's visibility to the naked eye. And underneath, the column head:

Astronomers say it may be linked to mysterious disappearance of Red Spot of Jupiter seven months ago!

After this, people everywhere discussed it in awed tones, for it was the most gigantic celestial phenomenon ever to occur—far outrivaling eclipses, Sun spots, novæ, and such. Scientists, and especially astronomers, were talking of nothing else.

Official recognition of the ball of red mist came about a month after the amateurs had announced it. The large telescopes, trained on the spot designated by the amateurs who knew their astronomy, never sighted the object, simply because their large magnification diffused the image beyond the point of visibility. Comets' tails, in the same manner, are best seen in small telescopes.

But when the huge red cloud had approached within 25,000,000 miles, it became a certainty, rather than a phantom improbability, like the canals of Mars. Immediately the public news machines began grinding out large type. And the masses were informed that the Red Spot, which had orphaned itself from Jupiter, was now in Earth's vicinity. For three days the public was entertained by rag bombasticness, and was told that perhaps in another day the Red Comet would become visible to the unaided eye.

There was no sign of fear till this point. The day of fear over comets and mysterious clouds in the sky had passed a half century before. The cry of "Wolf!" failed to arouse excitement. Then, on the very night that the Red

Cloud became visible to sharp eyes, as a faintly shimmering tuft of rose cotton in the sky, wires hummed—and were pulled—and a rigid censorship blanketed all public news.

The public, next morning, gasped in dismay to find news about the marvelous Red Cloud off the front page. The items, when found in the back, were disappointing. Before they had been elaborate, detailed, flamboyantly tabloid. But now, even though the Red Cloud had approached closer and become bigger news, the accounts had become smaller, and carefully worded to mitigate interest.

They avoided any mention of the Red Cloud's distance from Earth, or its direction of motion. It was obvious that a heavy censorship had been laid down—censorship as strong, or stronger, than that of wartime.

"Something is wrong!" every one cried, and the effect among the masses was second only to what the news itself, told truthfully, would have made.

IN SCIENTIFIC and authoritative channels, bedlam reigned. For it was now inescapable that the Red Cloud, which was the Red Spot come all the way from Jupiter in the past seven months, was going to collide with Earth! What made it so incredible was that weeks before, according to the amateurs' figures, the Red Cloud's course would take it no nearer than about 20,000,000 miles.

"What in Heaven's name," cried every scientist, "made that Red Cloud actually *turn* and plunge toward Earth!"

And saying this, each scientist set about to find the answer. And, in finding the answer, they found something worse.

Spectroscopic tests immediately showed that the Red Cloud was a hell brew of bromine, cyanogen and a dozen other deadly gases. The cold of space had caused condensation and contrac-

tion, but the internal heat produced by this had kept the Red Cloud in its gaseous form. Perhaps in a few years it might have condensed to a solid, or dissipated away, but at present it was a globe of hot and virulent poisons—and heading straight for Earth!

Tentative figures, scrawled by shaking hands, showed the total volume and quantity to be enough to saturate Earth's entire atmosphere. Billions of tons of poison gas were to be poured over Earth, and the only result could be universal death.

With this realization, the scientists went on with their work like automata. They went on recording data about the Red Cloud, as though their lives depended on it, when all the while their lives were forfeit. One thing they were able to figure—which perhaps gave a momentary thrill of pride—was the explanation of the Red Spot leaving Jupiter, and its strange turning in space to strike Earth.

It was not, as the newspapers might have speculated, because an alien race had fired it as a Cyclopean projectile toward Earth, aiming it by some cosmical radio control. It was rather to be explained that the Red Spot, in rotating at a different speed than either the planet or the rest of the atmosphere, had, by friction, become a highly electrified unit. The charge had built up enough since its formation, over a century before, to one day propel it away from the neutral planet, like a pith ball repelled by any charged object. The force of expulsion from Jupiter's surface had been enough to give it a velocity of 140,000 miles an hour, thus freeing it of the planet entirely.

Only a very malign fate could have aimed this accidental projectile directly on Earth, or on any other planet. The laws of chance were overwhelmingly against it.

But the laws of chance could not prevent the positively charged Red



When the air was freed of the alien gas, Walwin shut off the hissing oxygen tank. He then started a desperate effort to revive Finny.

Cloud from being attracted by the neutral Earth, in an electrical experiment on a macrocosmic scale!

III.

TWO THINGS happened almost simultaneously to shock Walwin Hoffman, immured in his small bathysphere,

AST—5

out of a state of dreamy contentedness. First, a gust of acid, reeking air came down the inlet tube. Walwin coughed and spluttered as the noisome stuff seared his lungs. Then he heard Finny's screech of fear.

"What the devil! Finny——"

"I'm choking, sir! Poison gas! I——"

"Finny, quick! Wet your handkerchief—hold it over your nose! No, tie it over your face—and haul me up. Hurry!"

For a minute Walwin heard only a racking cough from above. Fear clutched his nerves in an icy grasp, fear not for himself, but for the man above, exposed to the biting fumes, whose slight taint in the bathysphere was enough to make his throat raw.

"Finny! For Heaven's sake, answer me if you're alive!"

An answering voice came down the tube at last, but hoarse and tortured: "I'm not dead yet. I'm going to pull up now, sir—if I can!"

Slowly, the bathysphere arose. Several times it stopped as though the man above were resting and gathering strength. At last the diving ball came up in its place in the raft, and Walwin swung the hatch open.

He staggered back as a cloud of thick, red mist swept over him. Holding his nose, he scrambled out, picked up the sprawled figure of Finny, unconscious, and dumped him unceremoniously into the bathysphere. In another moment he was in himself, and had closed the hatch tightly.

Lungs retching violently, he opened the release valve of his emergency pressure cylinder. A blessed wave of fresh oxygen swept through the small inclosed space. When the air was freed of the alien gas, Walwin shut off the hissing oxygen tank.

Then he turned his attention to Finny, and after five minutes of pumping his diaphragm, like that of a half-drowned man, succeeded in clearing his lungs of the red gas. Finny opened his eyes, groaned and sat up.

"Mr. Wally, sir," he whispered weakly, "I'm going to die."

"Oh, no you aren't," contradicted Walwin. "If you had breathed enough of that gas to kill you, you wouldn't have revived at all. You're safe enough

now. But the people outside——"

A disturbing picture had come up in Walwin's mind. A picture of hundreds, perhaps thousands, filling their lungs with the terrible red gas, and dying wretchedly. What was it? A poison gas attack by a warring, cowardly, enemy nation? An eruption from Earth's interior? Something from space?

Walwin could not know. Nor could he realize that the picture he had formed in his mind fell far short of truth. He could sense nothing of the nightmarish thing that was happening outside his protective bathysphere. His uneasy mind, though, realizing it was some holocaust, did not picture more than a few thousand dying from this mysterious mist death. It must be some localized phenomenon, he conjectured, centering at this spot on Virginia's coast.

Nor having read the newspapers, and having lived a Crusoe-like isolation from the world for over a year, in order to pursue his fetish of undersea painting, he could not know that all the world was bathed in this deadly red gas!

THE RED CLOUD had first touched Earth's atmosphere over the Sahara Desert. Like a world-sized amoeba, it had then extended pseudopodia over Africa, Europe and Asia. In a few hours it had engulfed Earth completely, surrounded it, infused its entire atmosphere. Billions upon billions of tons of it, composed of cyanogen, bromine, carbon monoxide and other noxious or asphyxiating gases. Every nook and cranny of Earth's surface was searched out by the virulent molecules.

Lungs that drew in oxygen also drew in the poisonous red gas. It killed in less than a half hour. Life ebbed away before this withering breath from the brew pots of hell. People were stricken everywhere from the suddenness of it—in their homes, in offices, in factories, in cars, on boats, running or walking, sleeping or waking.

A hypothetical observer, skimming over Earth's surface in an inclosed air-ship, would have seen a sight unparalleled in our history, though not, perhaps, unparalleled in the history of Earth.

He would have seen ships wallow at sea, manned by an asphyxiated crew; automobiles gyrating wildly off the road to crash into ditches or buildings. Factory machines running on unattended for hours, till the supply of electricity or coal ran out; electric lights burning on, though there were no eyes to need them; a thousand and one devices of mankind surviving by a few hours the death of their masters and creators.

And everywhere he would have seen insane figures fleeing the descending cloud of deadly scarlet, to stagger, clutch at their throats—a few minutes of convulsive writhing—then stretched-out forms, still and quiet—

The billions of mankind, and the trillions of other animate forms of life were dead! Their innumerable corpses strewed the Earth from pole to pole. Death rode supreme over a ravished planet!

But no! There is life! Two hearts beat strongly, defiantly, there in a little sphere of metal anchored to a raft. And up in a cabin on the Upper Hudson—

IV.

THE FIRST TANG of an alien gas in the air he breathed, as he stood outside his cabin, brought a measure of satisfaction to John Appleton. It meant that, after all, he had not been such a fool for expecting the Red Cloud to collide with Earth. But it was with no satisfaction that he watched the venomous red color in the sky deepen. And later, when the thickest of the mists came, swirling violently beyond his window, he turned sick at heart, thinking of the millions who must be dying in agony.

Appleton had no idea how long he would be immured, but he was determined to fight it out to the last. He had fresh oxygen enough for a week. If, in that time, the red mists failed to dissipate or lose their potency, he would meet a belated death.

He resigned himself to staring out at the smoky mists that writhed beyond his window like carnelian snakes. The mist seemed to beckon to him. It seemed to speak to him above the steady, swishing roar which had ushered in the first of the Red Cloud. It seemed to be telling him, gloatingly, that it would get him, too—that he might as well come out now and have it over.

"I will strike all life on Earth low," it might have said to the straining man, "*all life!*"

"Great heavens!" mumbled Appleton, suddenly turning pale. "What if I am the last living man—the *last living thing*—on Earth!"

It was perhaps this thought that made him welcome the buzzing of a fly in the room. He watched it fly in aimless circle and finally land within reach of his hand, on the wall. He mentally pledged the insect immunity from death at his hand, and a free choice of any food in the place.

"Who knows, brother," he tried to say whimsically, to bolster his own spirits, "but what you and I—a fly and a man—are the last of a once great civilization! Two lives, and if I were to kill you, I would be killing off half the population of Earth!"

He tried to laugh at his own joke, but something caught in his throat. A picture had sprung unbidden into his mind, a picture of Times Square as seen from his office in Manhattan. By some magic of idea association he saw as clearly as though he were there the hideousness of that turmoil, with thousands of people trying to escape the red death. People fleeing, trampling one another, jamming subways and elevators,

shrieking, choking, gasping—dying.

It was so real that Appleton moaned a little to himself. Oh, if only they had taken his warning, those miserable, dying thousands and millions. If only they had sacrificed their pride enough to prepare halfway for the possible holocaust, fantastic as it had seemed just a few hours ago. Why had they been so obstinate, so willing to believe Earth was safe from harm? Why—

And so his jumbled thoughts went. It seemed to him that hours had passed in these first five minutes of his incarceration.

SUDDENLY he jerked upright in his chair. Were his eyes playing him tricks, or did he see something vague and black coming through the mist? After an intense moment of staring, he became convinced the black shape actually was there, and was coming down the road that led to the highway. In a hypnotic fascination he watched the black form resolve itself into an automobile.

It careened, slued sharply, and came to a grinding stop fifty feet away. Appleton caught a glimpse of a white face, before it slid beneath the line of the car window.

With an exclamation, Appleton ran to the door and began carefully peeling away the layers of leather which were held in place with tape. It was done in another minute. Before going out he wet his handkerchief from a bottle of water, and, holding this to his nose, jerked open the door.

A wave of nauseating gases swept over him as he leaped out and banged shut the door. The penetrating stuff seemed to eat through his handkerchief, and he had the sensation of being choked, as though the red mist had fingers with which it was constricting his throat. His eyes began to run with tears, as the corrosive stuff swirled about him relentlessly, houndingly.

Panic gripped him, and for an instant he thought of turning back, lest the next dawn would find him a corpse crumpled to the ground halfway between the car and the cabin. But the sting of near death by the blind forces around him aroused something in the man—something defiantly indomitable—and he ran forward in great bounds, holding his breath as best he could.

He reached the car blind and tortured, ribs aching from the effort of keeping his lungs inflated. He gained a momentary respite by gulping in a huge lungful of air from the interior of the car, which was comparatively pure. Then, with the speed of desperation, he flung the driver's body to his shoulders and staggered back toward the cabin. He stumbled on in a delirium of pain and exhaustion, and was never able, later, to remember the details of traversing that mist-ridden stretch of hell, nor opening the door and entering the haven of the cabin.

IT WAS fifteen minutes later, by his watch, that he picked himself off the floor and began meticulously patching the cracks around the door with tape and leather, coughing all the while. This done, he turned his attention to the figure he had tossed on his cot. Alarmed by the elderly man's purplish face, he began feverishly chafing his wrists and finally pumping his lungs. At the first sign of returning color, Appleton dashed a glass of water in his face, finding time to thank a beneficent providence that a live man had come out of the curtain of death to him.

Professor Joel Masters' first words, upon regaining consciousness, were typical of his sensitive scientist's mind. He sat up and looked through Appleton, through the walls—out to the ends of the Earth.

"The whole world," he said, his voice edged with an infinite bitterness, "is suffering—dying—"

"Maybe not the whole world," Appleton tried to say in optimistic tones, "after all, it's a big place."

"The whole world!" repeated the scientist. "That ball of red gas contained enough matter to poison every cubic inch of Earth's atmosphere. There is no hope."

Appleton was suddenly aware that the man was weeping. No tears were in his eyes, nor sobs in his throat, but within him the scientist was weeping in a great and silent sorrow that was insoluble in tears. He wept for the world, this man who had served the world.

Appleton made a savage effort to say, "Stop it, you fool!" but failed. He turned his back to the man and gazed out at the crimson mists of doom. He was aware that the scientist continued his silent wailing, as though he were officiating the wake of each and every soul that was now being released from corporeal bondage. Appleton felt like screaming. He continued to stare out at the red confusion of gases, with an abysmal hollow in his stomach.

V.

IT WOULD BE questionable to say whether in the event of an inescapable world doom it is better for the authorities to inform the masses or not. Inform them and let each work out his own preparation for the end? Or let the doom fall upon them with the suddenness of a striking ax? Which would be the kinder?

It would take a super-Solomon to answer that problem, since each such problem has no recorded precedent. It would seem that the shorter the realization of doom, the less mental suffering. But it might be argued that the terror of death, when death is inexorable, strangely fades rather than sharpens. Thus it might be less horrifying to know of the coming doom and be able

to face it, if not happily, at least calmly and resignedly.

The authorities all over Earth, following some beaten track of ruling psychology, chose not to publish official confirmation of the approaching disaster. Perhaps they hoped for an eventual escape. Or perhaps they underestimated the coming menace. At any rate, the overwhelming masses of Earth knew nothing of the near doom, except through rumor, which they optimistically disbelieved. When the Red Death struck, these millions upon millions passed from quick terror to rising panic—and then to death.

Among the small percentage who knew of the doom stalking them, most knew too late to do anything about it, and many reacted by falling into states of mental paralysis, panic-stricken incapacity to act helpfully, and actual insanity. There were a pitiful few indeed, of Earth's population, who knew of their fate, and acted in time to save themselves by preparations for incarceration.

And of these very few, how many were to survive the other hazards that came in the wake of the red mists: the fires, falling buildings, lack of an oxygen supply, and more subtle things such as weakened lungs and shocked, bruised minds?

A HALF HOUR after the rescue, Professor Masters was able to recount how he had come to Appleton's cabin. He had been driving from New York City to his family in the north. The incredible traffic snarl occasioned by the rapid spread of panic in the last hours before the arrival of the Red Cloud had delayed him so much that he knew he would never reach his destination in time. He had driven grimly on. When the red mists surrounded his car, he had crammed papers and rags around the window edges and turned off to-

ward the river. Here he had some vague, desperate idea of keeping underwater and perhaps escaping the red death.

Then, going on the river road, he had seen the cabin through eyes half blinded from gas that had seeped in. Why he had stopped he could not explain. Some instinct had seemed to tell him here was aid. Then the accumulated effect of the gas, which had gotten into the car and into his lungs told, and he had gone unconscious.

"And I woke up in here," he finished, gazing about the room curiously.

Appleton explained about the room, summarizing finally, "Well, here we are with food, water and air. We're safe enough—for a time."

"It would have been a longer time," murmured Professor Masters, "if I weren't here. Appleton, you're a brave, unselfish man. I could have been left out there—no one to later brand you for it. I—"

"Enough of that," cut in Appleton sharply. "We're here. Outside is the Red Death. That is the sum total of important things, beside which anything else is pure, senseless drivel. Everything we know or lived before is being swallowed up by that flood of poison gas. And it may get us, too, in the end."

The two men looked at one another levelly, strangely aware that they would never again speak foolish sentiment to one another. The intensely solid fact of the Red Death outside left no room for smaller thoughts.

Professor Masters broke into a fit of coughing. "Still some of the red gas in here," he gasped.

"I think we can fix that," said Appleton. He strode to his supply of pressure tanks and opened the valve of one. The invigorating wave of oxygen brought a look of relief to the older man's eyes.

FIVE MINUTES LATER a new look came into his eyes. He began walking around the room, sniffing carefully. Finally he swung around to Appleton eagerly. "Do you notice the same thing I do—no slightest trace of the red gas in here now?"

Appleton nodded, frowning. "But how could it escape? If it can't come in from outside, it can't do the reverse, either!"

Professor Masters was standing beside a pressure tank, and was stroking its escape valve.

"This is the answer," he said quietly. "Oxygen. When its percentage is increased measurably in any space, with added pressure, it becomes an extraordinarily active chemical reagent."

Once again the scientist, Masters, went on: "It then oxidizes almost anything, and rapidly. Carbon monoxide becomes the dioxide. Cyanogen becomes carbon dioxide and free nitrogen. Bromine does not oxidize, but under its influence precipitates, under these conditions, as any of several harmless products.

"Those three gases are the main bulk of the red gas. The free oxygen you allowed to escape into this room cleared the red gas out in five minutes."

Appleton wet his lips. "Does that mean anything to—?" He waved an eloquent hand to the regions outside the window.

"It means that overnight the red gas will have lost its potency! Plants produce oxygen at night—billions of tons of it over Earth. The red gas has not killed plants, not the many hardy ones, for they do not have an oxygen metabolism. Plants utilize—"

"But what does it mean?" burst in Appleton wildly. "Did you say—*overnight*?"

Professor Masters started, turned slowly pale. For a moment he had forgotten—

"It means"—he clipped out the words

harshly, bitterly—"that to-morrow the sun will shine on a world again fit for life, but with no life to inhabit it!"

A peculiar expression came up in Appleton's mind that was to stick with him the following hours of tormented waiting. "Life disinherited!" he muttered.

Professor Masters did not turn from the window, out of which he stared broodingly. Presently, Appleton stepped beside him. Together they looked out at the vast, lethal flood of crimson fog. Their faces reflected outwardly the red glare; from within, the complete despair of lost souls—

VI.

EIGHTEEN HOURS after they had immured themselves from the deadly red gas, Walwin noticed a lessening of the red glare in the water around the bathysphere. Relief came to his numbed mind. For a while he thought they were but delaying their eventual death, for the red mist had not disappeared. At one time he had even debated whether it would be easier to die from oxygen starvation in the bathysphere, or from poison gas, or from drowning. This had been when the pressure tank had failed to give out even the slightest hiss of escaping oxygen, showing the precious gas was all gone.

For two hours more he and the praying Finny breathed over the air in their tiny prison. At last it became so stagnant that Walwin's head began to ache tormentingly. He pressed his face against the upper part of the port window, which was half out of water, and peered out over the surface. The mist had changed from its original deep crimson to a light, rosy tint. Was that the shore he saw there, dim and fogged?

Walwin reached for the hatch bolt, almost too weak to stand.

"Say your last prayer, Finny," he mumbled. "I'm going to open up. We can't breathe this air any more. Not

a damned oxygen molecule left in it and——"

He jerked open the hatch savagely, defiantly. If it was to be death—

"—amen!" wailed Finny, as a stream of cool, but acid-tainted air rushed over them.

It tickled their throats and set them to coughing. "Oh, Lord!" moaned Finny, and began to take up a new prayer.

"Shut up, you fool!" cried Walwin joyfully. "This air is all right. A little pungent"—he strangled a cough that threatened to strangle him—"but no worse than my old chem lab at college. The red mist has had its fangs pulled. Come on, out we go!"

Fifteen minutes later, breathing deeply on the raft, they knew they had been saved. Their throats felt as though they had swallowed broken glass, and their lungs were sore, but a growing strength suffused their muscles. The twenty-hour ordeal in the bathysphere had been torture, mental as well as physical, but it was over. Finny thanked his Maker profusely. Walwin felt as though he had been dead and buried, and then resurrected. His spirits soared exuberantly.

"Start up the motor, Finny boy. We'll have something to eat at the house first. Then we'll fix those flats, drive to town and find out what this is all about. Maybe somebody just hung his socks in the wind."

Finny's simple face was a mask of gravity. "I don't like this business at all, sir," he murmured gloomily. "My witches' bones told me this was a big thing—bigger than we think."

"Nonsense!" scoffed Walwin. But within himself was an uneasy feeling he could not define. Just how widespread had been the red mist's activity? Miles, perhaps? Or perhaps—

He checked himself as his thoughts sprang to unreasoning conjecture. It could not be more than a local event,

something for the rest of the world to read about avidly. Anyway, the red mist was fast vanishing away. It lingered now only as a glow of light vermilion. And maybe that was mainly a reflection from the setting Sun, which was often red.

After eating, Walwin found himself too tired to go to town, so it was not till next morning that he and Finny, after repairing the two flat tires, embarked for the near-by village in their little-used car. The distance was some thirty miles along the coast, an hour's drive.

IN THAT HOUR a feeling of dread came over Walwin. The light vermilion mists lay everywhere, in all directions. As they went along, they noticed little things that added up to a mad answer. No cars met them on the way. Not one human being was sighted; it was autumn and there should be workers in the fields of this farming community. There was not a single chicken or dog or scurrying rabbit. And when Walwin once stopped the car and turned off the engine, they were greeted by an aching silence—no drone of bee, no chirp of insect or bird!

An unnatural, oppressive silence lay over the land like a cloak. What could it mean? The young artist's brain seethed with ominous thoughts that he tried to quell.

Soon direct signs of catastrophe came to them. A car was overturned in a ditch. Walwin stopped. But he did not have to get out to see the two men's bodies beside the wreck. Their twisted faces plainly told of the horrible, strangling death that had overtaken them.

Farther on they stopped at a farmhouse. They left with a shocking scene burned into their minds: a whole family of seven lying lifeless in the neat home. They had been eating dinner, grouped about the large, round dining table. The red-death gas had belched upon this

happy family circle, striking them lifeless. The mother had despairingly grasped two of the children, had tried to keep the deadly fumes from their little noses with her apron. The older children had stumbled toward the back window for pure air, only to be met there with the red fury. The father, a robust man, had valiantly tried to close all the windows—his dead fingers still clutched the drop of a half-open window. His body had crumpled over the sill——

Sudden death!

They went on, two live beings in a land of universal death. They sped by another wrecked car, resolutely turning their eyes away. Out of the corner of his eye Walwin had a glimpse of a white figure—a young girl huddled in an attitude of prayer——

Finny groaned aloud. "Wally, sir," he quavered, "there can't every one be dead, can there?"

"Of course not!" said Walwin, but with no conviction. "That red mist, whatever it was, did a horribly complete job around here, but there must be a limit to it. There are 20,000 people in the town ahead. Lord! They can't all be——"

Dead! 20,000 corpses inhabited the town they drove into! Walwin drove grimly for two hours through the streets, before he was convinced of it. At places their path was blocked by fallen buildings, torn down by the brief but violent wind that had come in the wake of the red mist of death. Bodies lay everywhere, faces contorted, hands clutched to throats.

Walwin stopped the car, sick to the very core of his being. He closed his eyes, but the tragic scenes wheeled nightmarishly across his reeling mind. 36 hours before, this had been a busy, bustling city of humans. Now it was a great tomb—utterly and completely lifeless. There were not even scavenger flies humming around the corpses. The



*They went on, two live beings in a land of universal death!
Twenty thousand corpses were the only inhabitants of the town!*

red mist had accomplished a total annihilation of animate life.

GRASS, trees and most other plant life had survived the strangling death. But in the months to come, they, too, might be blighted for lack of a constant supply of carbon dioxide. Thus Death would at last ride supreme over the corpse of Earth.

Walwin stirred out of a deep brooding that was matched by the supernal silence around them. A wave of panic

swept over him. He clutched Finny's arm spasmodically. "Talk to me, Finny! For Heaven's sake, say something, so I don't *hear* this damned silence! I——"

"Mr. Wally!" gulped Finny. "Don't go on like that!"

Walwin released his grip, took a long breath. "Have to watch ourselves, Finny," he said, "so it doesn't *get* us! It almost did me there for a second—Lord! the thought of——"

He broke off, began again: "Listen,

Finny, we'll have to accept this just the way it is, and not think too much about it. Otherwise we'll be a couple of psychopathic cases in short order. We'll have to plan a course of action, just as if things were normal. First of all, we'll eat. Then we'll head north toward Washington. This red mist must have ended somewhere, and we'll run out of its area of activity by going in one direction. Come on, let's find a grocery store. At least"—he grinned ruefully—"we can have our choice of foods at no cost."

Before they found a grocery store, they came upon a building that announced itself as a newspaper office. On sudden impulse, Walwin stopped the car and went in. He shuddered at the dozen bodies within the door, but saw what he wanted—a newspaper.

The carefully worded account of a giant red cloud hanging in space inflamed his curiosity. A search in the files of back numbers revealed the entire story. The story of approaching doom he had been so blissfully unaware of in his idyllic retirement.

It left him stunned, white-faced. He had thought it ghastly to find a town of 20,000 lifeless. His worst pessimistic thought had been that perhaps a few dozen other towns and cities had been likewise visited by the red mist.

But here was the stark revelation that *the whole world had suffered the same fate!*

VII.

BEFORE they stepped out of the cabin, in which they had been besieged by the now-impotent red gas for almost 24 hours, Appleton and Masters had come to the tacit understanding that they would not talk of the red doom, would not endlessly remind each other that life on Earth was no more. They would simply take up a new course of life and concern themselves with little things.

With his methodical habits as a scientist, Masters took care that the outer atmosphere was fit for consumption before venturing far from the cabin and its store of life-giving oxygen. In science, he informed his companion, theories were only made to be tested. The great chemical reaction which he believed to have taken place overnight—the interaction of oxygen released by plants and the red gas, both in macrocosmic proportions—might and might not have occurred.

"I'm going out," he announced, "for a half hour. You must close the door behind me. I'll stand in front of the window so you can watch me. I'll breathe deeply. If I should feel myself weakened and could not make it back to the door—"

Appleton nodded in understanding. The scientist stepped out and carried through his crude, but effective, plan for detecting possible poisons in the atmosphere that had so lately held death in every breath. A half hour later he joined Appleton, smiling wanly.

"Breathable, all right," he stated. He closed the door. "However, there's still a sharp tang of bromine, as I suspected from the vermilion color that is still left. Not much of it, but we'll stay in the cabin to-night. The odor of cyanogen is also quite noticeable out there, and there must also be some carbon monoxide, though it is odorless. But the latter two gases kill only at certain concentrations. They are not accumulative in action, like lead poisoning. They kill on the spot, and quickly. Since I survived without collapse for a half hour, it means that their concentration in the total atmosphere is below that point where they are potent. All the lesser gaseous poisons which came with the red cloud have been reduced to harmless proportions. So the atmosphere is once again breathable to organic life."

Appleton looked at Masters as his

voice faded, and saw that he had fallen into a state of brooding thought. Appleton, too, felt a gloom descend over him. Earth was once again a habitable globe—but uninhabited! He turned this strange irony over in his mind, and found it mentally unpalatable. Why had this come about? Why?

Masters looked up as though he had heard that unvoiced query. Then he shook his head as though to say: no sense to ask why. That is a question unanswerable to mortal minds.

That was as close as the two men got to making a topic of the one thing they dreaded to speak of. Appleton stirred himself.

"Let's have something to eat," he suggested.

The next morning they stepped out of the cabin in a dawn of fiery red that faded gradually to a rosiness which remained, grim reminder of the deadly red fog of the day before. Then they left the cabin, ventured in Masters' car out into a new world.

VIII.

WALWIN AND FINNY pursued their way northward, changing from car to car whenever the gas tanks emptied. The next two days were like a feverish nightmare to the two lone humans. Hopefully, they approached Washington, with its many white buildings and the great Capitol dome—symbol of a mighty nation. Had the red mist struck here, too? Had it in one brief day wiped away the core of a government which had marked a new and grander phase in human history? Could Congress, the Cabinet, the Supreme Court, the President—names for a power as seemingly durable as rock—could that all have been whiffed to eternity in a few short hours!

It was almost an inconceivable thought to Walwin, yet he knew the answer. He knew he could not expect

this city of tradition and history to have survived any more than the dozens of other towns and cities they had found lifeless. And as he drove the car slowly through the cadaver-strewn streets, its motor purring almost silently, an overwhelming realization of this super-catastrophe swept over him. As though impelled by other wills than his own, he stopped the car before the Capitol and strode up the broad, white steps in a vast, tomblike silence.

He seemed to feel a crushing weight descend over him. The blind, all-powerful forces of an immutable universe seemed to stand over him, laughing in mockery. A nameless all-pervading voice seemed to say, "Look at your so-called civilization! Look at mankind that dared to think it was master of the Earth and of the universe! Little man, who was an ant in the path of the Juggernaut of marching time, which levels all!"

Walwin could not think clearly in smaller terms. As he gazed out over the building tops, his eyes seemed to penetrate to every portion of this great land. And everywhere his inner vision saw death triumphant, saw unnumbered hundreds of tombs that had been cities, millions of corpses that had been a bustling nation.

His vision extended itself, reached across the ocean, to picture four great continents speckled with the dead. Ancient glories, vivid histories, timeless traditions—all canceled. The strivings, warrings, goals of centuries and millenniums totaling zero.

Walwin seemed to hear ghostly voices arising—the disembodied cries of Earth's murdered billions. Like a distant echo they filled the air, sobbing, wailing. From every direction, from every corner of Earth, the spirit chorus wafted, sad and moaning. It was as though Earth were haunted by souls that hovered around it!

A fine sweat had beaded Walwin's

forehead. His face had become strained and haggard.

As from a distance, he heard Finny's voice, anxious and questioning. "I'm all right, Finny," he heard himself saying. But he could not shake the heavy mood from his sensitive mind. He continued to brood on the soul-shaking thought of world death.

But suddenly his perspective wheeled around. Some alien will seemed to tug at his mind and drag it out into space. Suspended in the void, he took account of the vast cosmos with its uncountable suns, its limitless extent, its eternal duration. After all, Earth was but an insignificant mote in the immensity of the universe. And the life on Earth was but an evanescent phenomenon, one of many in the halls of eternity. A superentity, taking census of the cosmos, might even have skipped this tiny green speck and failed to count it in with the other myriads of worlds.

The thought of all-Earthly life having been destroyed might be a terrific holocaust in his, Walwin's, conception. But what, if anything, could it mean in the great scheme of the macrocosm?

"Wh-what are you thinking about, sir?" came Finny's frightened voice. He did not like the brooding stare that he saw in the young artist's unseeing eyes.

Walwin started as though from a trance, sighed deeply. "O. K., Finny, that's over. I was just—just"—he groped for a simple explanation—"looking at this in a different way. You see, Finny, it's likely that you and I are the only two humans left on Earth. It doesn't much matter what happens to us either, does it? If we think that way, we'll stay—healthy."

Finny looked at his master with a peculiar lack of the abysmal panic that had been in his eyes before. "I'm thinking, sir," he said quietly, "that we aren't the last two of God's children. I rolled my witches' bones while you were think-

ing, and they tell me we're going to find others alive!"

Walwin started. Others alive! He had not dared to give himself this crumb of hope. For two days they had toured the countryside slowly, hoping for other survivors, but there had been none. Not even a dog or a bird. The red mist had apparently done a thorough job. But why couldn't there be other survivors? Why couldn't the kind fate that had shielded them from the death mist also have saved others, in accidental ways?

"Damn you, Finny," cried Walwin, "you and your witches' bones may be right at that! We're going to make a thorough search for probable survivors. We'll tour around every day and all day. There isn't much else to do anyway."

Imbued with a purpose that would give them some reason for wanting to live on, they embarked in a shiny new car and left the city. Strangely, at first they had felt guilty when taking over a new car, or when entering a food shop to eat. The habit of conscious wrongdoing clung to them, despite the apparent absurdity of it. But this had rapidly worn off, and at times now they felt a momentary thrill of undisputed proprietorship over an entire world of things.

ON AND ON they went, watching in every direction for the slightest sign of movement. They had by now become inured to the picture of widespread havoc and death. Even the sight of a man's body tossed into a tree by the collision of two trucks, and hanging by one foot from a crotch directly over the road, failed to elicit more than a glance.

Their minds no longer involuntarily counted the dead, nor their eyes looked at them horrified. They were concentrating on the one absorbing pursuit of finding some one—or something—alive.

Walwin almost lost control of the

car when Finny's shout, and his own eyes, informed him of movement in the road ahead. Heart pounding, Walwin drove up close, jammed on the brakes, and ran out with a cry of pure joy.

He picked up the cat just before Finny grabbed. He hugged the animal close to him, petting it fiercely and murmuring half brokenly. Then, as though bestowing a priceless treasure, he handed it to Finny, who buried his face in its soft fur with tears in his eyes.

"We should feel like fools," said Walwin, "making such a fuss over just a cat. But considering it's the *first live thing* we've seen in almost four days it—"

They promptly named it Adam and took it to the car with them. Black and sleek, it snuggled purringly into Finny's lap, obviously glad for human companionship after four days of perhaps puzzled loneliness. It looked well fed, and for a moment Walwin had hopes that it had a human master thereabouts. But then he realized that food was no problem in this world where there were no irate "scats!"

Walwin's hand strayed to pet the animal now and then, as he drove along. It was not just a cat. It was a symbol of hope. Some inexplicable thing had saved this cat. The red mist had not been omnipotent. Somewhere, sometime, they would find another human who—

IX.

IT WAS while they were eating at the counter of a delicatessen store in a small town in Pennsylvania that their heads shot up at the sound of faint throbbing from outside. With a wide-eyed glance at each other, Walwin and Finny dashed out into the street, swinging their heads all ways to catch the direction of the noise. In the absolute quiet it seemed to come from everywhere.

Then, with the suddenness of a bomb,

a car swung around the corner and headed away from them. Shouting like madmen, Walwin and Finny sprinted after the vehicle. For a heartbreaking instant it seemed that the driver would not hear or notice them and drive on, and Walwin had completely lost his head. Otherwise he would have jumped into a near-by car and given chase. As it was he stopped and stood like a shipwrecked sailor, forlornly watching a ship sail by his island.

At the moment he did think of using a car, he noticed the other car, now a block away, slowing down. Then it gyrated wildly, bounced against one curb, veered to the other and ran up onto the sidewalk and into a plate-glass window with a tremendous clatter in that great silence.

Walwin was there as fast as his legs could carry him. Praying that the crash had not been fatal to the driver, he panted up. Then he stopped, stock-still. He felt his heart stop, too, for a moment. He could only stare at the girl who stepped out, and she at him. Their eyes locked in a gaze of indescribable intensity.

Walwin found himself speechless. No less, apparently, the girl. He had tried to picture this scene in the past hours—this meeting with another survivor. He had thought of words to say for the occasion, a cheery greeting. He could not bring them to mind now. Anything he might say, anything at all, would sound fantastic, ridiculous.

There is that strange joy when two friends meet whom fate has kept apart for years. There is that poignant happiness when one who has been saved from death returns to his loved ones. There is that overwhelming emotion that must have arisen when Robinson Crusoe met his man Friday. But the feeling that swept over these two in that instant of meeting was of far greater magnitude.

Four days of wandering over a lifeless land, and then to find another alive was——

WALWIN suddenly found the girl in his arms, sobbing fitfully against his shoulder. She gave out her story in broken words, as though casting off a burden—the fearful hours of the red mist, the realization of universal death, the maddeningly lonely hours and days of wandering and searching for other survivors.

"You can imagine," she concluded, somewhat more composed, "the violent shock when I saw you in the rear-vision mirror of my car, waving your arms. A knife seemed to go through me; I just went limp like water. I was conscious while the car swung this way and that, but I was powerless to raise a finger. Then there was the crash. I didn't feel it. My only thought was to get out, to get out and meet a live human being after——"

She shuddered. Then she drew away from Walwin, dried her eyes, and smiled happily at Finny, who had been standing there with a foolish, but welcoming grin.

"My name's Eve," she said. "Eve Beckwith, of Philadelphia."

"Eve! How appropriate!" murmured Walwin. "Mine should be Adam perhaps, but instead that's our cat."

"A cat!" screamed the girl. "A real live cat? Lead me to it right away!"

The three humans walked down the street in a curious state of dazed happiness. For in finding one another they had the firm hope of finding yet others in this world scourged by the deadly red mist. Walwin gave his name and Finny's and then told how they had been saved.

The girl had been saved quite accidentally. She had been sorting canning peaches in the earthen basement of the old rambling house at the edge

of town in which she lived with her spinster aunt. Suddenly there had been the disagreeable odor of the red gas. Alarmed, she had run to the cavern's only opening, to be met by a stinging, blinding cloud of nauseating red gas. It was with the strength of desperation that she had reached up and swung to the solid oak trap panel.

This had effectively sealed off the red gas, had also immured her totally from the outside world, with only a four-inch length of candle to light the Stygian darkness. First she had been horribly sick, physically and mentally. Her aunt, out on a shopping tour, must be dead or dying! Her parents, in the small town she had left to get a job in the big city, they, too, would be——

Then she had snapped herself out of hysteria, realizing her sanity depended on being calm for the following hours. She had level-headedly snuffed out the candle, to conserve precious oxygen, and steeled herself for an indefinite stay in her damp, lightless, spider-infested tomb. A day and a night later she had crawled out, miserable and coughing.

"At first," she finished, "I felt tremendously relieved that I had escaped alive. Not only relieved, but glad. Then, a little later"—her voice became husky—"I did not feel so happy about it. I saw the hand of death around me. Everywhere! Hope that the doom had not been widespread vanished, as I drove all through the city—a city of the dead! Then those horrible days of driving and searching, searching for life that seemed to have been extinguished *en masse*, save for myself. I went halfway to Mayville, my home town, then turned back. I did not want to destroy that last picture in my mind of a contented father and smiling mother living in peaceful happiness."

The girl's strained face softened for a moment. Then a look of raw horror came into her eyes as she went on:

"I decided to head north, into the thickly populated seaboard, in the hope that there had been survivors by sheer weight of numbers. Instead, there were only greater heaps of the dead. Lord! The utter loneliness of it—the aching emptiness——"

She was suddenly sobbing again, in Walwin's arms. For a moment he comforted her and murmured, "Poor girl! Poor frightened girl!"

FINALLY she broke away, ashamed of her weakness, and they made their way down the street. Finny following behind. Their footfalls scraped inordinately loud in the vast stillness which had lain over the world for four days. Although they did not realize it, they were involuntarily treading lightly, as though fearful of disturbing the oppressive quiet. Their eyes constantly darted to and fro; they held their heads to one side, ears strained forward.

Suddenly, they caught one another's eyes. It was the girl who voiced their common thought. "Always looking, looking," she whispered. "And listening, listening. For four empty, endless days. Looking for movement that lurked, it seemed, just beyond the next corner. Listening for sounds that did not exist——"

They had arrived before the food store in which the two men had been eating, and the girl uttered a little shriek. Adam, licking his chops and sunning himself in well-fed contentment, looked up at them in feline nonchalance.

"You cute little rascal——" The

girl scooped him up eagerly, cuddled him tenderly. Walwin watched with a half smile on his lips. Then he turned to Finny, who stood by quietly, not showing much of his feelings of relief that he and his companion were not the only two left alive.

"Finny," he said crisply, "see what you can dig up in the line of food. Those canned shrimps were good, and that mince pie—be sure it's cellophane wrapped. It isn't Thanksgiving, but we'll make it a Thanksgiving feast."

Finny disappeared into the store front, and from its interior came the sounds of falling cans.

"Funny," murmured Eve, "I didn't have any appetite to speak of for four days. Now I'm violently hungry!"

Their meal over the store's counter proved to be an hour of merry chatter and light spirits. As though a crushing load had been lifted from their minds, they found it not impossible to laugh and be gay again. Four days' of accumulated depression slipped away. For a while they did not feel as though they were isolated in a universe which had disinherited life.

But when conversation lulled, Walwin caught himself straining—straining to hear sounds other than those they made. He noticed the girl, too, sitting stiffly, tensed. He realized, in part, how the last four days had affected them, changed them; perhaps taken away forever their ability to be at ease, and replaced it with an aching sense of loss. Perhaps they would always be looking, listening——

THE SANDS OF TIME

by P. SCHUYLER MILLER

will appear in the April issue of *Astounding Stories*

The Great Thought

A Thought-variant

by K. Raymond

THOUGH metaphysics deals with reality, an air of the unreal hung over Harvard's hall of science on the evening of January 6, 1944, as Alexander Crayton, Ph.D., LL.D., professor of philosophy in Harvard University, began to address the tense gathering from the yellow-lighted stage.

"Fellow members of our American Metaphysical Society," Professor Crayton said nervously, a thin, elderly man in wrinkled black suit, leaning heavily on the black cane he always carried, "I—ah—have asked and received permission to make the opening—ah—speech of to-night's special meeting. I fear that what I am about to say will anger you. But gentlemen, this—er—attack you plan against earth's television broadcasting is useless folly. Again I warn you: television is not back of the—ah—scientific problem which mankind faces.

"Gentlemen, to earth I predict the coming of a complete experience of the universe. This experience will give us a complete metaphysics. Indeed, it will entirely do away with the—ah—need for metaphysics!"

Dynamite exploding within the old walls of the hall of science could not have made a greater uproar than did Professor Crayton's direct, astounding words.

But young Professor Guy Van Sohn, thirty, associate professor of philosophy in Yale, a tall, thin metaphysician in gray, by his shrill, cutting voice quieted the hall and challenged the seventy-year-old speaker.

"I say, Professor Crayton," he said,

great, dark eyes gleaming, jerkily twirling the ends of his trim, black mustache, "this is a bit thick, you know! Your idea that a *complete thought* rushes through the cosmos toward earth, like a gas cloud, was ridiculed at yesterday's discussion. Your theory that the first vibrating impulses of this thought cloud is the brain-paralyzing force that has repeatedly attacked all people of earth during the past month is absurd!

"Really, old boy," continued Professor Van Sohn, hatred of the aged scientist—who had often disproved his proudest metaphysical theories—showing in his insolence, "this meeting was called to plan a scientific attack on the problem of modern, high-powered television broadcast. Have we not already decided that television impulses, since the building of the mighty universal transmitting tower in New York, have been changing brain tissue, and are, therefore, the direct cause of humanity's brain storms?"

ANXIETY paled mild Professor Crayton's deep-lined face, as a loud roar of voices and shouts of "Hear, hear!" greeted Professor Van Sohn's snarled words. Professor Crayton leaned more heavily on his black cane, sadly shaking his gray-haired head.

Then, when all was again quiet, he said, "Professor Van Sohn, you, as well as all other gentlemen gathered here, misuse instinct and metaphysics. Naturally, your first instinct is to believe that humanity's increasing brain lapses are caused by something on earth.



And since to experience mentally is to think the experience—Professor Crayton thought himself (as did all humanity) a strange being in a strange universe.

Then, as metaphysicians, you manage to find a bad reason——"

"You say our reason is a bad one."

Professor Van Sohn's thin lips curled.

"Suppose you tell us why!"

"Surgeons can detect no—ah—change in brain tissue, as would be the case if high-powered television impulses were attacking man's brain."

"Bah! The breakdown of tissue cells could easily remain unseen, even with post-mortem ultramicroscopic examination!"

"Well then, my young colleague, there are people who—ah—work where ether is absolutely free from the powerful television impulses; yet they have suffered from the same repeated—brain storms—I believe you termed them—as the rest of us."

Professor Van Sohn's hollow cheeks flushed red, as Harvard's hall of science buzzed with the astonishment of the gathered philosophers.

"What!" he cried. "Impossible! Whom and where are such people?"

"Underground workers of the thirty-mile-deep Arizona Interior Heat Bore. Two days ago, January 4, 1944, to be exact, I flew to Arizona by plane, solely to disprove this society's television-impulse theory of humanity's—ah—brain storms. My instruments could detect no television waves at the thirty-mile depth. Yet the men down there, including myself, were seized by each of the two dozen, fifteen-minute attacks of brain paralysis which came that day. So you see, the television-power idea of brain change is worthless."

Professor Van Sohn stiffened with anger and annoyance. "Indeed! And by what supermetaphysics was born your mad dream of the complete-thought impulse whirling through the solar system like a gas cloud?"

"My—ah—dear young philosopher"—Professor Crayton made a halting step forward to the platform's edge. He bent down earnestly, chest almost touch-

ing his two hands atop the black cane—"so unusual a problem needed an urge of thought far above actual experience for its solving. You younger scientists smile at the intuitive method of thinking which I use as the key to deep philosophical questions. You prefer the mathematical or machinelike use of the mind. You use mass logic, forgetting that metaphysics is the science of the—ah—*individual* mind——"

"Oh, I see!" interrupted Professor Van Sohn. He turned to the rows of assembled scientists behind him. "Gentlemen, the great thought flood, soon to wash earth as Professor Crayton believes, is his individual brain wave!"

A GREAT ROAR of laughter echoed within the yellow-lighted hall of science.

"Please—please, gentlemen!" Professor Crayton faltered. "Laugh at me if you wish. I still say that a vast thought is flowing through the heavens toward earth. It is close at hand—for strength and number of humanity's brain attacks have steadily increased. I warn you: either a mighty communication of thought comes, or else a thought will bent on conquering all alien wills——"

"Gentlemen—an attack—another brain attack—begins!"

Into Professor Crayton's brain was flowing a paralyzing stream of pure consciousness. And he knew—as he always knew in such attacks before the last impulses of his own ego had been washed under—that all humanity, all conscious organisms upon earth, were being gripped by the same astounding power: *a vast, cosmic essence of will.*

In Professor Crayton's brain the flowing consciousness hummed as the power of a television carrier wave hums. And for one hour, longest period of the many, many transcendent brain attacks of the past month, he stood as turned to stone, waiting—waiting——

Waiting for what?

For a mighty thought, it seemed. A thought that would bring a wonderful message—or an all-conquering alien will that—

Then, as though but another of the first splashes of a rolling wave, the flow of pure consciousness passed—for its humming stopped. Once again, Professor Crayton's ego, freed from greater powers, jerked him out of a waking trance. He found himself still leaning on his black cane, staring down at a suddenly milling, shouting turmoil of metaphysicians who, like he, had just got back mental self-control.

"Gentlemen, we—we must be calm," Professor Crayton begged haltingly. "We must plan. The inner life of a mighty being—or of a physical event—will soon be upon us. Will it be a wonderful message? Or will evil vibrations shatter the brains of all earth organisms? Let us make the—ah—best scientific preparation for—"

Tall, lean Professor Van Sohn interrupted by leaping to the platform, dark face crimson with anger. "I say, gentlemen!" he cried, and his shrill, cutting voice quieted the crowded hall of science, "we've had enough of Crayton's nonsense—indeed! I call it insanity! Our psychical estimate of these brain storms is that the universal transmitting tower, New York's center of earth-circling television, is to blame! Why, the first day it was in operation, broadcasting its ultra-powerful ether vibrations, the brain attacks began. And does not the brain hum sound exactly like that of television waves?"

"Only—ah—coincidental," faltered Professor Crayton.

But Professor Van Sohn continued: "So! The problem is a simple one of earth. Gentlemen, we have great power in New York's government; we shall have the tower torn down!"

"This—this is sheer madness! You shall see—"

Professor Van Sohn said fiercely: "I shall see that you resign from the American Metaphysical Society—after I am proved correct in this matter! We cannot have one whose judgment is unsound—whose beliefs are those of insanity—in our midst!"

Deep silence within the yellow-lighted hall of science—

Then a mighty roar of approval. Gray-haired Professor Crayton trembled, would have fallen but for his cane. Bent lower than ever, tears coming into his faded blue eyes, he began to slowly limp off the platform amid jeering shouts and harsh laughter, when—

Again a sweeping flood of pure consciousness—now a mighty roar of inner sound—burst into his brain—into the brains of the gathered metaphysicians—into every brain of earth.

Professor Crayton stiffened like a statue. The roaring tide of consciousness was bringing its first great thought—an irresistible will to believe—a promise of *fulfillment*—of purpose—of the coming of knowledge accidentally hurled throughout the cosmos—

The roar within Professor Crayton's skull died away. His brain filled with thought—*thought* as cold as space between the stars, chill with absolute reality and truth. Mentally, he was experiencing the complete thought, and since to experience mentally is to think the experience—Professor Crayton thought himself (as did all humanity) a—*strange being in a strange universe.*

HE WAS the scientific starfish, a vast five-armed being of thin fluid that glowed with faint white light. Large as the stellar cosmos visible from earth, he was, nevertheless, but a tiny organism floating in his supra-world of limitless ether. From his five arms, sensitive to forces in the bluish ocean around him, came the unseen power that gave him motion, controlled his world.

The scientific starfish's brain was

a huge, nervous system amazingly complicated. He was wildly excited; for within that brilliant ring of white fluid near by—which he could not know as the whirling earth cosmos with its countless stars and planets held together by the denser universes of the Milky Way—no bigger than the tip of one of his five arms, a life impulse had beat.

A life impulse in supposedly lifeless matter!

Throughout his supra-world, the scientific starfish flashed the amazing news that life had come to the tiny gelatine ring he had toiled to form—

He—the scientific starfish—had created life!

Swiftly toward him, swimming through the vast ocean of blue-glowing ether, thousands of the mighty starfish came. Pulsing thought speech, they gathered around the scientific starfish.

"Life in that jelly ring?" vibrated the first starfish. "Nonsense! The thing is but psychical in origin!"

"No! It is vegetable life," came the oscillating thought of the second starfish. "It cannot move!"

The scientific starfish spoke mildly. "The creature is now an entirely normal being of living thought—formed by the scientific change-of-thought method. And where others failed with mechanical shock, chemical irritation and other worthless ways of bringing life into thought gelatine, I did it by will stimulation of nerve fibers telepathically formed within the jelly."

THE gathered starfish pulsed with mixed emotions—but fear and anger were strongest.

"You have put science to base uses," said the first starfish angrily. "We have no right to create life. But since you have brought this gelatine ring of living thought into being, what use do you intend to make of it?"

"As a key to explain the queer waves

of consciousness that have flooded our brains and reflex systems at various times lately," answered the scientific starfish slowly.

"How?" came a mighty chorus.

"You see, this white jelly ring is now a hyper-excitable creature of living thought, and when its tiny cells—the scientific starfish could not know them as stars and planets—"have increased to the proper number, the ring will vibrate to intense emotional thought far beyond our limited senses. It will, I hope, re-vibrate these ultra-thoughts in our own thought range, thus telling us the secret of these strange waves of pure consciousness. And it is barely possible that we will learn the secret of all things!"

Because the first starfish was very big, and formed of a denser, brighter white fluid than any of the others, his mocking laughter was loudest.

"And how," he pulsed scornfully, "will you get in touch with this simple form of life you have made?"

"To tell you in detail would be difficult," said the scientific starfish mildly. "But it was made by will, and its reflected thought waves—its thinking aloud in any key, as it were—can be understood through willed reception."

In a few supra-moments—like countless billions of years in the tiny Milky Way ring of starry universes, whose suns and planets were nerve cells in the quivering earth cosmos—the little white-glowing circle grew in brightness. Its light drove away the blue of the ether ocean in which it floated, brightened the lower, sharp tip of the scientific starfish's controlling arm. And then—

A colorful corona of rainbow fluids formed around the gelatine ring, as the latter's fluid surface wrinkled. The wrinkles deepened—as density of the Milky Way increased with the explosive birth of countless new universes.

"How swiftly its nervous system grows!" exclaimed the scientific starfish

softly. "See how the jelly circle begins to tremble to the striking of thought vibrations in the ether fluid! Look how its beautiful corona of colors shimmers in our thoughts! Soon it will reflect thought waves of any length, changing their vibrations to fit our limited scale. Then shall we learn why great thought impulses have often paralyzed our brain and reflex systems lately—perhaps we will learn all that was hitherto unknowable!"

"This is an unholy experiment!" flared the first starfish, tips of his five arms white with anger. "It must be stopped! With a single thought impulse from my force arm, I shall melt that hoop of gelatine——"

"No, no!" came the scientific starfish's shrieking vibrations. "See! The tiny thought brain—it begins to think aloud! Will—*will* to hear its reflected ether thoughts!"

A sudden wave of many-colored thought bursting from the quivering jelly ring, shocked the many gathered starfish into stillness. As the prismatic tide swept over their white-fluid bodies, the starfish vibrated to a sensed humming——

Familiar humming of the oft-repeated brain attacks of late.

But this time the humming grew into a mighty roar. Then into receptive centers of the starfish flowed knowledge, knowledge that held them spellbound.

For the colorful ring of living thought—the strange thing *willed* by the scientific starfish in a queer flash of intuition—radiated a mighty secret.

The secret of all things that are.

But to the scientific starfish—he that floated nearest to the glowing ring, and he who had strongly willed to know its awesome message—came the clearest thought images.

His fluid brain was cold, cold as the ocean of blue-glowing thought in which he and countless other starfish floated out their supra-universe lives. A chill

thought of the complete consciousness came to him. Since living that thought made him live that consciousness, the scientific starfish strangely—*saw himself as the creative power.*

HE WAS the stupendous will that controlled all. A will formed of everything and nothing. Oddly, he was aware that a brief pause in his willed evolving of things had come. A serious pause, though not one bringing any threat of ending his will.

But he knew that, because of its unusual activity, a tiny area of his will was worn to exhaustion. Though but a little black dot in the cold, white flame of the will, it loomed gigantic to the supra-universe, and completely dwarfed the earth cosmos into a comparative microscopic invisibility. Fatigue was the only possible damage which the will could know.

The will decided that a short rest—though billions of years in the supra-universe, and almost eternity to the earth cosmos—was needed.

Of course time stopped while the will rested.

The will was now directed to flowing new energy into the supra-cosmos cell that had tired. For it was no part of his will that a single supra-cosmos cell should melt through weariness into the void gas in which the will flamed cold-white——

The will must remain sensitive to all things great or small.

Momentarily, the will thought over everything the brief pause had already done. Billions of tiny wills, impulse cogs of his will, had been given a glimpse of things beyond themselves. For, with the tiring of a supra-cosmos cell, the nearest cell (supra-cosmos cell within which was the earth cosmos) was made overactive, and, therefore, oversensitive.

But it was not good that one supra-cosmos cell of the will should see far

beyond itself. So its destruction had been willed.

In an instant—though supra-geological ages to the supra-cosmos cell, had not time ceased for that instant—trillions of tiny wills would scientifically weld stars, planets and universes of the sensitive cell into a swelling supra-cosmos of matter. Internal pressure would explode the overactive cell, release its flowing energy, and give new will to the tired, dark cell next to it.

Such was the fate of the supra-cosmos that held the earth cosmos. But it was not tragic—for it was all part of the will.

Let understanding spread throughout the supra-cosmos cell that was doomed. Let it receive a flowing consciousness of things outside itself.

For with that understanding went joy and happiness in knowledge that the flaming white will guided all. And the countless tiny wills of the supra-cosmos cell would rejoice in their very doom, for they would understand that—death is but the birth of new life.

In each world, decided the will, one superior will should receive the first intuitive flash, and thus prepare the wills of the wisest around them to fulfill their destiny.

Wills of the doomed supra-cosmos in glimpsing truth—and the way truth was revealed would vary in each world—would wonder to find the dynamic system of the scheme of things based upon nothing—and that even the flaming white will was nothing. But they would also learn that nothing is everything—

For only nothing is eternal. Only nothing will make everything possible. And only nothing may—*begin and end itself*—

IN the supra-universe the scientific starfish shook his five-armed body, and it was as the shaking of a thousand earth cosmos. His thin fluid substance—ten times lighter than a similar fluid

of earth—was dim, diffuse, as was the white phosphorescence of all the gathered starfish—now waking as from a mighty dream. For one queer second, he—like the other starfish—had thought the will. Good that time, controlled by the will, had been stopped—else that unimaginable second had equaled 10^{22} supra-seconds or a thousand billion supra-years!

The scientific starfish's sight impulses stared around the bluish ether ocean. Near by he saw the tiny ring—the Milky Way, dense outer shell of the earth cosmos—with its jelly of starry universes, slowly sinking downward in the vast blue. It was gray now, rainbow colors gone; for the ring no longer vibrated to strangely active impulses.

For a long time, ether of the supra-cosmos was still. Finally, the scientific starfish vibrated weighty thoughts—and now none among the many gathered starfish opposed him. His awed thoughts were received in silence and with respect.

"From highest to lowest on the scale of cosmos size has the will permitted this glimpse of things beyond. That our supra-cosmos cell is doomed, because of this glimpse, and because its will energy is needed to refresh an adjoining cell, matters not—for we know now that one and all are part of the will."

Then came very mild and very respectful thought impulses from the first starfish. "And as the will guides the will of all, so should wiser wills among lesser wills lead. You, through whom came the first intuitive flash of truth, must lead us on. This we now know."

"Though we were the first to glimpse things beyond," said the scientific starfish, scarce aware that the first starfish had spoken, "the great thought will sweep down to the tiniest universes. And its wave will grow larger with the thought of each cosmos through which it passes. That gray ring, small to us,

but—as we now know—really a mighty cosmos of stars, suns, planets and nebular universes, must needs know of our supra-cosmos, and what took place here, before they may glimpse the will and——

“And so down the relative scale of size, throughout the giant, yet tiny, supra-cosmos cell of the will, shall the great thought go on——”

CRAYTON suddenly awoke to the reality around him. The roaring consciousness in his brain had ebbed. Again he knew himself as the thin, bent scientist in a black suit, who stood on a platform and leaned on a black cane. Again he saw the gathered metaphysicians sitting or standing amid the rows of chairs in yellow-lighted hall of science—newly awakened from the strange glimpse into the *scheme of things*.

And beside him on the platform, Professor Van Sohn was passing a trembling hand across dark, oddly moist eyes.

Upon each face, Professor Crayton saw a profound awe—awe which he knew was likewise seen in his own features.

For many minutes all was silence within Harvard's hall of science. Then Professor Crayton spoke in hushed tones.

“Fellow metaphysicians, for one second—eternity to us of earth, had not time been stilled—we have known the will. Beyond our limited senses have we been taken, shown that all is one and the same unity. Now we may carry on our destiny without fear of the far stars and vast heavens. We know that everything is rooted in firm eternity, and that back of all things is the guiding will. Everything has eternal life and value, for everything is part of the will—is the will.”

The gaunt, gray-clad form of Pro-

fessor Van Sohn turned toward Professor Crayton. Professor Van Sohn had changed greatly. Harshness was gone from his dark features. His great black eyes now shone with a soft light, and his thin, mustached lip no longer curled with scorn as he reverently spoke to his once-ridiculed scientific enemy.

“Alone, the one scientist of earth,” he said softly, “you foresaw the coming of the ‘Complete Experience.’ And you correctly predicted that we would receive a complete metaphysics; that the need for metaphysics would forever be done away with! Professor Crayton, forgive us—we fools of so little intuitive imagination that we thought man-made forces—television waves—lay back of this mighty happening!”

Professor Crayton nodded absently. For now he was slowly speaking—scarcely aware of repentant Professor Van Sohn.

“Onward must earth science march to uphold man's part in the one totality—to fulfill the wondrous desire of the will——”

“But you who first received intuitive knowledge of the great thought”—Professor Van Sohn was saying earnestly—“must guide our lesser wills—as he guides them all. Was not that *revealed* to us?”

“Professor Crayton, I speak for the American Metaphysical Society, yes, for the cosmos—which will some day be as one—when I say that *you*, the wisest of us all—*must lead the way!*”

Professor Crayton scarcely heard the mighty roar of approval. He was as one seized by wondrous vision. Slowly, his bent form straightened; black cane fell to the platform floor. And his wrinkled old face suddenly smoothed with a look of strange joy.

“I foresee an incredibly glorious future,” he said happily, amid awed quiet. “A future which the will is creating. Queerly enough, it is of nothing—yet of everything——”

COSMIC CACTUS

*Article No. 10 in the
Study of the Solar System*

by JOHN W. CAMPBELL, Jr.

IT SEEMS TO ME that in all human history no man was so fortunate as Galileo, the first astronomer to look through a telescope. The Greeks had specified six magnitudes of stars, the first being the brightest stars in the heavens: Sirius, Betelgeuse and such great suns; the sixth magnitude, the faintest *there were*. Not, remember, the faintest the human eye could see; they did not believe that. They thought those the faintest that existed.

Galileo discovered a new universe. He found that there were far, far more stars—stars never before seen because of their dimness. He had to invent new terms, such things as “seventh magnitude.” There were no such terms; they were strange to his tongue, sounded queer in his ears, no doubt. They sounded strange to all astronomers. The Greeks had said there were six magnitudes; then who was this upstart Italian who said there was a seventh magnitude? Stars Aristotle and Ptolemy had not mentioned?

And these moons that he reported, the things he had thought at first simply more of the infinite number of new, strange stars that made all existing catalogues meaningless? He had caught sight of them on January 7, 1610. “In the first hour of the following night, when I was viewing the constellations of the heavens through a telescope, the planet Jupiter presented itself to my view.

“As I had prepared for myself an excellent telescope, I noticed a circumstance which I had never been able to notice before, owing to want of power in my other telescope, namely, that three little stars, small but very bright, were near the planet. Though I then believed them to belong to the number of fixed stars, yet they made me somewhat wonder, because they seemed to be arranged exactly in a straight line parallel to the ecliptic, and to be brighter than the rest of the stars equal to them in magnitude. The position of them with reference to one another and to Jupiter was as follows:

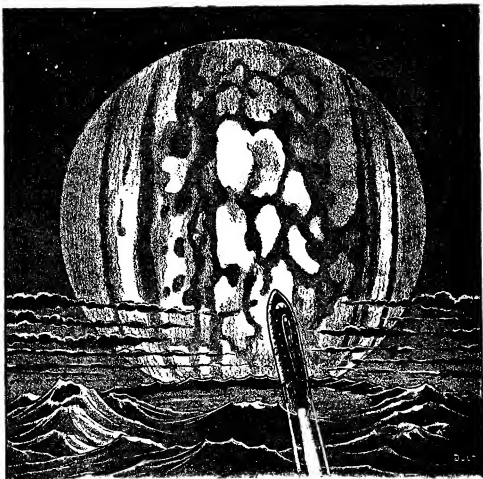
East * * 0 * West

On the east side there were two stars, and a single one toward the west. The star which was farthest toward the east, and the western star appeared rather larger than the third.”*

HE DIDN'T KNOW then the importance of that discovery, but they intrigued him. The next night he observed again, but found their positions shifted. Still further interested, he eagerly awaited the next evening.

The next night he saw the moons, and identified them definitely as moons, because they were still near Jupiter, though Jupiter had moved on its orbit. He found a fourth presently, and the roster of the four giant satellites of the

* From “The Sidereal Messenger,” by Galileo Galilei, 1610; translated by E. S. Carlos, 1890.



Hour after hour, day after day, fuel would have to roar into the driving rockets ceaselessly striving to break the grip of the planet.

giant planet—Io, Europa, Callisto and Ganymede—was complete. No other satellite was found during the course of two and three quarters centuries; not until 1892 did E. E. Barnard find a fifth, tiny moon very close to the planet.

Then, in December 1904 and January 1905, C. D. Perrine photographically detected two more very small moons. In 1908 photographs were a bit more sensitive perhaps, and the eighth known satellite was discovered; the ninth, but quite probably not the last, was discovered in 1914. However,

the following table gives some idea of why the two and three quarters centuries elapsed before further discoveries were made:

JUPITER'S SATELLITE SYSTEM

Satellite	Distance From Jupiter's Center (miles)	Period Of Revolution (days, hrs., mins.)	Diameter (miles)	Date Of Discovery
V	112,600	0 11 57	100?	1892
Io	261,800	1 18 27	2320	1610
Europa	416,600	3 13 13	1960	1610
Ganymede	664,200	7 3 43	3200	1610
Callisto	1,168,700	16 16 32	3220	1610
VI	7,114,000	250 16 0	80?	1904
VII	7,292,000	260 1 0	25?	1905
VIII	14,600,000	738 21 0	16?	1908
IX	15,000,000	745 0 0	15?	1914

The numbering of the satellites is somewhat irregular, because they were originally numbered in their order out from the planet, those now named being I, II, III, and IV. But when Satellite V was discovered in 1892, and remained unnamed, it was numbered in the wrong order. Then the remaining four were numbered as discovered, and we can only be thankful the order isn't more confused than it is.

Incidentally, Satellites VIII and IX are a particular annoyance to astronomers, because, though they are very small and very unimportant, they do nasty things to theories of the origin of the system, how the planets were torn from the Sun.

All the planets revolve about the Sun in the same direction; they all turn on their axes in the same direction. The Moon, Diemos, Phobos, all the other satellites of Jupiter, nearly everything else in the system—except comets and meteors, and Heaven alone knows what one of those will do. But those two little, fifteen-mile hunks of rock go the wrong way. Two boys on roller skates going the wrong way in traffic. But when the astronomer devises his theory that accounts for tearing the inconceivable masses of Jupiter, Saturn and the other planets from the Sun, of the creating of worlds and the moving of them—the roller-skate brigade must be accounted for, too. They haven't done it yet, which is particularly annoying, considering their size, and general unimportance in the scheme of things.

But they are interesting in another way: they show vividly the titanic power of Jupiter. Fifteen thousand thousand miles from his center, those little worlds bow to his sway, turning in regular orbits, bound inexorably by his gravity. Fifteen millions of miles, nearly half the distance from the Sun to Mercury. Their periods of more than seven hundred days are twice the length of Earth's year; yet, despite the savage

pulls and cross pulls of Saturn, the Sun and all the other planets, those satellites stay put.

And in a different way, that one hundred-mile world, Satellite V, tells the same story of immense power. At just about half the distance of the Moon from Earth, it circles Jupiter; but it makes its trip, not in twenty-eight days, but in eleven hours. Io, a world as large as the Moon, is whipped around in an orbit larger than Luna's, but in the fierce grip of Jupiter, the Moon, as large as a minor planet, makes the circuit in a day and two thirds!

THEY ARE barren, airless, frozen rocks, these small satellites, but when men develop space ships, they will approach them with deep respect. No man is going to venture quickly and thoughtlessly near to Satellite V. There is the difference between a major planet and a minor. The surface gravity of Jupiter is only 2.5 times that of Earth, not a vast difference. But when a space ship once goes from our Earth to the Moon, it will be a simple task to reach Mars.

Luna is three fourths of the way to Mars, in one sense. The hardest part of the trip, fighting free of Earth's gravity, will have been accomplished. Actually, it would be, right to-day and with present knowledge, a not impossible task to go from Mars to Luna, but we can't make the trip from Earth to Luna!

In space, distance is not so important; you can coast forever. But what will drink the power of space ships is the force of gravity, reaching out dragging fingers between the worlds. The force falls off as the square of the distance increases, and with small worlds, that is a very swift decrease in force. Thus, when you have fought your way from Earth up through a quarter of a million miles to the Moon, the force of gravity has declined from the normal-surface

gravity of Earth to one thirty-six hundredths as much.

Thus: Earth's surface is four thousand miles from the center of the planet, and gravity there is one unit. The moon is sixty times as distant, therefore the

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force will be $\frac{1}{60 \times 60}$, or 1 thirty-six

hundredth. Luna's surface gravity falls even more swiftly.

But Jupiter will be mighty hard to leave, even after its crushing pressure has been conquered. Before Jupiter's pull is reduced to one thirty-six hundredths of Earth's gravity, the ship will have to pull to a distance of four million

to roar into the driving rockets, ceaselessly striving to break the grip of the planet.

When space-ship pilots are the tough he-men of the solar system, the men that run the ships from Earth to Luna will be mere ferryboat pilots, to be scorned by those who cross the gulfs to Mars and on to Pluto. But not so the men who run the ships from Io and Europa and Callisto. That is no ferryboat run. It will require the finest, toughest, most powerful ships in space.

It will be a savage run, accounting first for the mighty drag of Jupiter, then allowing for the swiftly changing, shuttling pulls of the four giant moons,



one hundred thousand miles, out beyond Callisto, and more than halfway to Satellite VI. And every foot of all those four millions of miles, the ship will be battling the savage grip of the giant planet. Even there, of course, the ship will still have the rest of the field to shake off—even at that distance, a three thousand six hundred-ton ship will still have to use a steady drive of one ton to hold its own. Hour after hour. day after day, fuel would have

weaving and interweaving their by no means insignificant fields of force.

But is there anything on those moons of Jupiter worth going to all that immense labor to procure? Are they worlds, or are they some genus of cosmic cactus plant, bleak, barren rocks without value and particularly hard to approach?

IN THE FIRST PLACE, the smaller satellites can be discarded as

being of no direct value. They are inevitably bleak, utterly barren masses of dead rock. One possible application of practical use they may have however: Satellite VI, the eighty miles of rock that revolves seven million miles out from Jupiter, might some day be of immense value as one rung of a vast ladder reaching from the inner satellites of Jupiter out into space; it might serve as a refueling station for interplanetary ships. There they could break the long, long climb from Jupiter's grip.

But the four major satellites are the ones of real interest. Io and Europa are each nearly two thousand miles in diameter; Ganymede and Callisto each approximately three thousand. The latter two are slightly larger than Mercury, somewhat smaller than Mars. Is there anything we can deduce from these facts that may apply to four worlds, near planets in their own right, at a distance from us so great that no accurate observation is practicable at present?

First, from the Earth-Moon system we might guess that they all face Jupiter eternally. They revolve once on their axes, while making one sweep around the planet. This is confirmed by photometric work, in the case of three, and in the case of the fourth, spots can be seen on its surface to substantiate the photometric work. Then Io has a solar day of one and two third Earthly days; Europa's equals three and a half of ours; Ganymede's day is about equal to our week. But Callisto turns with respect to the Sun only about once a fortnight; a day something like Luna's. That is too slow for a world of that size.

The long, long night at that vast distance from the Sun, brings cooling too severe for the day's heat to entirely overcome. The density of Callisto is only one and three tenths times that of water. Jeffrey has suggested that it is water—ice.

But there are other conclusions we can consider; from any theory we may choose to accept, we can feel sure that at some time in the early history of our solar system every body was heated to an enormous temperature, thousands and tens of thousands of degrees. Mars, slightly larger than Ganymede, cooled from that furious heat, losing most of its atmosphere as it cooled. But, being a small mass, it cooled swiftly, swiftly enough to retain some air still. Ganymede, a similar small body—could not cool! Those moons found themselves permanently parked in the near neighborhood of what was at that time a full-fledged sun. Jupiter was hot, and it stayed hot. It was three thousand times as massive as Mars, with three thousand times as much matter to cool off. But when both planets were gaseous, Jupiter was denser than Mars, for its greater gravitation compressed things thoroughly. That meant that far more mass, far more condensed, had much less cooling surface in proportion.

By the time Jupiter, at last, decided to cool down, the satellites had long since cooled to equilibrium with their surroundings, but the surroundings (Jupiter) hadn't helped any. They stayed hot much longer than a body that size had any right to. And their atmospheres must have floated away into space. Airless—bleak—

BUT—how about the vast quantities of flaming hydrogen and oxygen that Jupiter, still white-hot, was throwing out into space? It couldn't entirely escape its gravitational field—the field was too vast. But it may have made a fine flying start, and fallen part way back, back only as far as those much cooler satellite worlds.

Bleak, airless rocks, exposed only to the Sun and vacant space, are black, or brown. The Moon's airless rocks are grayish, pumicelike stuff. Such material has a low reflecting power. But

measurements show that Io is as reflective as Jupiter's surface, the shining, cloud-wrapped surface of a deep-atmosphere planet! Europa is even brighter, while Ganymede is four fifths as brilliant. Only Callisto is dim, about one third as reflective as Jupiter. Io, Europa and Ganymede all have fairly high densities, two and two tenths to three and five tenths times that of water, resembling that of Luna, or ordinary Terrestrial rock. Callisto, as has been mentioned, might be a vast sphere of ice, with its density one and three tenths, covered by a thin layer of dust and rocky dirt to make the reflective power low. But, at any rate, the three high-density planets—which would suggest rock—have high reflective powers suggesting atmospheric elements. The one dark moon has so low a density it *must* have the atmospheric elements hydrogen and oxygen.

Let us guess now; we haven't enough observational data to do much more. Ganymede is as large as Mercury, a bit larger. It is at a low temperature, so far from the Sun, and would be quite able to retain the slow-moving, chilled atoms of atmosphere. The atmosphere would probably consist of heavy gases such as carbon dioxide, oxygen, perhaps a trace of water vapor. It would be a cold, cold world, nearly one hundred degrees below centigrade zero. No fit habitation for life to develop in; it was not warm long enough to give stubborn life a chance to develop, evolve an adaptable form that could withstand the cold.

Jupiter no longer does any good; it is cold, terrifically cold on the water standard. Its vast disk reflects some slight amount of heat from the Sun, but

not enough to do much practical good. Ganymede is, perhaps, very like the antarctic in the middle of August—its coldest month. But while the antarctic thaws out each summer, Ganymede has no summer; the cold is eternal. Men might live there, find minerals worth braving that unending, horrible cold to reach. With insulated domes, heated by atomic power, perhaps, gaining breathable air by electrolyzing water frozen in great motionless glaciers (even glaciers would be frozen motionless there) they could survive.

Io and Europa must be much the same. It snows there frequently probably, thin-voiced blizzards that howl around mountains of ice, driving flakes of frozen carbon dioxide. It is too cold to permit water to melt, and volatilize; only carbon dioxide steams into the atmosphere to fall in blizzards.

There might be something worth seeking—weird, accidental deposits of rare elements not found on Earth. There is no predicting the vagaries of nature. One of the rarest of the rare Earth elements is ytterbium, a queer element, useless to-day. It is an element present only in vast dilution in Earth's crust. Yet, by some queer trickery of nature, there is a mineral in which this element is found as an almost pure compound, ytterbium phosphate.

Some such vagary might have occurred, making Callisto or Ganymede, Europa or Io important in the trade of worlds to come. But—people seldom study carefully the cacti of the world. They repel attention. It would probably go unnoticed; the great moons would be left to their bleak, cold blizzards of carbon dioxide, in the mighty grip of Jupiter.

Next Month:

BEYOND THE LIFE LINE

Article No. 11 in the Study of the Solar System

by John W. Campbell, Jr.

The Second Cataclysm

*They still call themselves "men"—
and their name for Tyblani is "earth."*

by Dow Elstar

WE HAVE no chance then, Kor Situ? We must all perish?" "It seems so, mighty ruler of Tyblani. I gave warning two hundred days ago, but no one listened. A few of us could perhaps have burrowed deep into the crust of our planet, where there is a chance for survival. But now there is no time for that."

"And you are sure that there is no other way for us to save ourselves, Kor Situ?"

"None, at least that our limited science could ever apply effectively."

For a full minute there was a tense silence in the vast, cavernous hall. Hard, white light, stabbing from glass globes fixed to the ceiling, spread garishly over the motionless multitude.

Had a man of our era looked into that hall at that moment, he would have felt small sympathy for its occupants, even though they were faced by a plight which to us seems as vague and unreal as a nightmare. They were far from human. Their forms suggested the unthinkable baroques of some remote and ghoulish planet of another galaxy. Few of us would have believed that our earth could ever spawn creatures such as they.

Sluglike and horrible, they crouched in a packed horde on the floor of the chamber, their multiple eyes fixed on their ruler and on the scientist, Kor Situ, who squatted close together on a raised platform.

But in some respects the kinship of these beings of Tyblani with us of today, was remarkably close. They already had ample reason to feel fear; but,

as in the case of humankind, there were many skeptics among them.

Gradually, a rising murmur of doubt and derision replaced their stunned silence. Some one hissed a throaty insult, and others followed suit, until it appeared that in a moment a third of the entire concourse would be heaping abuse on the learned Kor Situ.

THEN, HOWEVER, something happened which restored the scientist to a position of respect. Through the high, slitted windows of the hall stabbed a tremendous blaze of light. An instant later there was a fearful, rolling concussion that made even the solid masonry of the floor vibrate perilously. After that came the roar of sudden wind and deluging rain.

Kor Situ saw an opportunity to convince the doubters, and he was not slow to take advantage of it.

"Nothing but lightning and thunder," he said in the sibilant speech of his kind. "As you all know by the experiences of the last several days, both are exaggerated in intensity to a degree far above normal. I have told you that our sun is on the verge of an explosion. Intense magnetic radiations from it have supercharged our atmosphere. That is why, all over Tyblani, violent electrical storms are raging. Thousands of our race have already been killed. Perhaps within a short time no one will be able to go abroad under the open sky without being instantly electrocuted."

"Tell my subjects more, Kor Situ," the ruler commanded. "Tell them all



Crouching there, with the lurid flares of the storm flickering on his ghoulish body, Kor Situ waited. It was the beginning of the end—

that you told me! The waves that bear words through the ether will carry your voice to the farthest corner of the planet. Proceed!"

"Much of what I can say will be a repetition of what others have said and written," the scientist began, his grotesque body bending close to a small microphone apparatus. "It has long been known that new stars suddenly blaze forth in the firmament. For a short period—usually only part of a year—they burn brightly; then their emanations wane again. They are not truly new stars at all, for they have always been there in the sky, though before and after their period of phenomenal activity it is not usual for them to be visible to our unaided vision.

"Their light-giving capacities are suddenly multiplied hundreds of thousands of times, as the result of their explosion. Their substance is hurled outward with terrific speed, causing them to expand enormously. Later, the force of gravity, inherent in all matter, causes a contraction of the scattered material, and these stars return to a normal, or approximately normal, state.

"Just such a phenomenon is about to take place in our own sun now. As yet, the intensity of its heat and light has increased but little. Yet my observations proved months ago that this catastrophe was coming. Certain fine solar emanations revealed to me subatomic processes whose unnatural violence can have but one result. Within ten days, at best, we shall be burned from the face of this planet."

"And the planet itself—Tyblani," the ruler prompted. "Will it also be destroyed? Tell my subjects your theory, Kor Situ."

"GLADLY, most mighty," the scientist answered. "To me it seems improbable that a world as solid as Tyblani could be disintegrated even by the forces of the exploding sun; though, if

we leap to conclusions, it is easy enough to believe that such a calamity would happen. But I have considered carefully all angles of the question, and I am sure that our planet will at least be able to survive in some form.

"It is true that when the sun bursts, its substance will actually touch the surface of Tyblani. Tremendously heated vapors, hurled outward at a velocity approaching that of light, will envelop this world for many days. But those vapors must necessarily be very tenuous. This is true because, though the sun's volume will be multiplied millions of times, causing the solar sphere to actually fill the orbits of several of its planets, its mass, in spite of this expansion, must obviously remain about the same. There is no outside source of matter for it to draw on; in fact, some minor part of the materials it contains will be changed into energy.

"Tyblani will be bathed in superheated flame, and in inconceivably intense etheric vibrations of every form. But since the gases of the flame will be as thin, almost, as the gases of a comet's tail, their powers of destruction will be limited. Tyblani's oceans will boil away; perhaps the heat will be sufficient to reduce all the water in them to free hydrogen and oxygen. The crust of our world will be fused and even vaporized to a considerable depth; but the vapors themselves, still for the most part retained by our gravity, will shield the deeper, solid crust of Tyblani from the solar radiations. When the nova fire dies down, our planet shall still exist, a hot, rejuvenated, lifeless sphere, such as it once was, shortly after its birth. Its gravity shall have attracted to it much debris and dust from the solar explosion, and enough oxygen, hydrogen, and nitrogen to replace that portion of its original supply of atmosphere and water that was stripped from it during the catastrophe.

"Since the danger that Tyblani will

be completely destroyed is small, I have argued that we might have excavated caverns far under the ground, wherein a few hundred of us could continue to live. We might have laid up a supply of food and water there to last for centuries. Our science of synthesis is rapidly progressing. With plenty of energy in the heated rocks above, and in the eternally molten core below, to draw from, we might soon have learned to manufacture food and all our other necessities from inorganic materials. We might have gradually extended our cavern empire, and increased our numbers. But now this cannot be, for there is insufficient time. We can only go about our business as usual, and try to maintain a philosophical attitude toward our fate."

Kor Situ finished his speech with a dejected sigh.

"You have no more to say, then?" the ruler asked.

"No more," the scientist replied. "And now, most mighty, if you will permit it, I shall take my departure. There is much that I wish to accomplish during the last days."

TO AVOID the milling throng, Kor Situ left the hall by way of an underground passage. Presently he emerged into a broad, mawlike portico that fronted on a rain-drenched street between grotesque edifices of black stone. The spires of those edifices loomed gaunt and eerie into the midnight sky, in which rippled an endless pyrotechnic display of doom-born lightning.

From a niche in the wall the scientist drew an odd vehicle whose two wheels were set in tandem, after the fashion of the wheels of a bicycle. Skillfully, like a bounding mass of live rubber, he vaulted to the padded seat mounted on the mechanism's frame. In response to the forward thrust occasioned by his act, the thing's curious internal-combustion motor, which burned a fuel com-

posed of a gasolinelike mixture of volatile hydrocarbons, awoke to life. Throbbing evenly, the machine bore Kor Situ along a paved way which was protected from the fury of the elements to some extent by an overhanging arcade.

The cannonading of the thunder was incessant. Gusts of hot rain struck Kor Situ's body, making him crouch lower in his seat. If he had been weird before, from the human viewpoint, he was more so now, with the ghastly light flickering upon his wet flesh.

To see a trained beast perform those things which we normally regard as being the natural acts of *Homo sapiens* alone, is always to us something of a miracle. But this great, slimy slug did not have even the friendly, subhuman aspect of a circus animal. He was different and grotesque and unknown, and to this alienness of his was added the fact that the machine he rode, and all that was artificial around him, was the product of the inventive powers of his own kind. No man had had any part in developing the science of Tyblani.

Kor Situ rode on, breasting the storm with a savage fury of impatience and regret. He wasn't afraid of coming events; but that his various researches must be broken off so abruptly, just when the mysteries behind them were deepest and most fascinating, aroused in him a maddening bitterness. His whole being burned with mute and futile protest against inexorable nature; but there was nothing that he could do except to try to make the most efficient use of his every remaining moment. There was one matter in particular, the secrets of which he wanted to see revealed as he had never wanted anything else in his life.

AFTER SOME MINUTES, Kor Situ reached the building which contained his laboratory. Utilizing a spiral runway, he rode to the topmost floor, which was his own private domain. Here

he adjusted certain pieces of apparatus, strange and quaint to our way of thinking, but understandable in the light of modern achievement.

Now he squatted before a small cylinder covered with a whitish substance akin to paper. His outlandish body leaned forward, tense with savage eagerness. A thick, pulpy member of his, fitted with soft, boneless digits, moved a little metal bar—a switch. Electric current flowed through thin copper threads, setting up magnetic fields just as would have happened on our everyday earth. The parts of a queer, complicated electric motor began to hum busily, turning the cylinder.

Other apparatus was also active—devices which have counterparts familiar to us, yet always deviating widely in detail from those things which we know: photo-electric cells, detectors for wireless impulses, generators, engines. Tyblanian science surpassed ours of today to some extent, but in nature both were parallel, as is to be expected. Intelligence, no matter in what diverse shapes it may be cast, attacks its problems according to the rules of logic and experiment; and since natural law is universal and unvaried, results, always, must be similar.

Kor Situ watched the turning cylinder with breathless attention. A little stylus touched it with varying pressure, making a dark line that was sometimes wide and sometimes narrow, depending on whether the stylus was pressing hard or lightly against the rotating paper. Round and round went the line in a low-pitch spiral, as the stylus crept gradually along the bar that supported it.

The process was almost identical to that of our telephotography. The spiraling line was slowly building up a shaded picture or diagram. Kor Situ was elated. For days he had been trying to interpret correctly the delicate radio impulses that he had been receiving from an unknown source. Now,

after much trial and error, he had found the correct synchronization pattern, and was getting results.

Slowly, the simple picture grew. Now Kor Situ could see a large, lightly shaded area which he was sure represented a star at the beginning of a novel outburst. Near it was a small, dark disk, which he supposed was intended to be a planet.

It was true then! Some one or something, somewhere, had also learned of the threatened solar explosion. Could the mysterious source of the radio waves that activated this graphic reproducer of his, be another world? Kor Situ could think of no other answer.

If this explanation was correct, did those entities across space want something of him? Were they trying to convey a plea, information, or instructions vital to both themselves and Tyblani in the coming calamity?

WITH A CARE that allowed him to miss no minute detail, Kor Situ studied the now finished picture. Its mystery, however, was no less deep. It was just a kind of diagram of the solar system to which Tyblani belonged. There were the planets; there was the exploding sun. Nothing more except a few blurs and flaws occasioned by static during transmission. Even these short radio waves coming out of the unknown were not entirely immune to the interference of the tremendous electrical storms that raged over Tyblani.

Kor Situ was extremely puzzled, but still he could attack his problems in a logical manner. If he radioed an impression of the picture back into space again, not just as he had received it, but in such a manner that the spiraling lines that composed it would run approximately at right angles to the original lines, the entities who had tried to communicate with him might not only pick up his broadcast, but they would see,

too, that he had been able to assemble the impulses they had sent out, forming them into the picture they were meant to create.

To put this idea into operation was not at all difficult. Our own modern science could have accomplished the same thing easily. Kor Situ took the paper, on which the picture was traced, from the cylinder, turned it so that its lateral edges were now its bottom and top, and then wrapped and fastened it into position again. Next, he replaced the stylus with a tube that could throw a tiny, threadlike beam of light on the revolving roller, which bore the picture. Finally, he placed an opaque hood of metal over the entire apparatus. In the top of the hood was a sensitive photo-electric cell.

The latter could detect the quantity of light from the tube which each portion of the picture reflected. The cylinder rotated as during the process of reception, the tiny thread of radiance tracing a spiral path around it, just as the stylus had done before. Dark parts of the picture passing beneath it reflected less light to the photo-electric cell than did those which the stylus had not shaded so deeply. Thus the diagram of unknown origin was unraveled for re-broadcasting.

Light impulses became electrical impulses; and the latter, in turn, were amplified, and converted into radio impulses by Kor Situ's powerful transmitter. The picture was being sent out again, but according to a different pattern than the one by which it had been received. The Tyblanian was sure that if his hidden friends were able to detect his wireless waves, they would be able to reassemble them according to his new plan. If they did so they would know that he had received their communication as it was meant to be received—as a picture—and such knowledge, to them, should be important.

THE TASK FINISHED, Kor Situ waited, meanwhile busying himself with a few routine laboratory matters. Maybe the hidden ones would send another picture that would carry on from the point where the first had left off.

After thirty minutes the sound diaphragm of Kor Situ's receiver buzzed briefly, and a strange, incomprehensible voice spoke from it. Uttering a few equally incomprehensible words. Then silence returned, and was not broken again.

Nevertheless, the great slug continued to wait hopefully. Why didn't they, who shared the grim knowledge he had wrested from the sun, continue with the attempt to communicate intelligently? Why—when there was so little time left, and when they had made but a bare beginning?

The scientist hissed what was the equivalent of a curse in his language. Yet he did not give up his vigil, and he knew that if nothing more came to him from the unknowns from out of the mute ether, he would still be keeping watch at the end.

And his brain worked on unchecked, all through that horrible night of wind and rain, and crashing thunder and lightning. The scientist's mind seemed to draw a keener power and scope from the yammering elements that suggested a dozen Thors gone raving crazy.

He thought of a thousand things of scattered origins. Maybe it was some ancient noval outburst that had hurled the planets from the sun. This was, as far as he was aware, a new theory of the birth of worlds. Was it possible? All the planetary orbits lay in approximately the same plane. But who knew? Maybe that vast, creative explosion had been mostly along the sun's equator, projecting the fiery droplets of the planets outward in a disklike pattern. Who could be sure that this was not the way it had happened?

Crouching there with the lurid flares

of the storm flickering on his ghoulish body, and on the weird equipment around him, Kor Situ thought of the things that had been in ages past, and of the other things that now could not be, in the future. There was much in the geologic history of Tyblani that he could not comprehend. He remembered, with a vague puzzlement, a perfect little cylinder of black carbon, reposing now in a museum. It had been found in a deep mine, far below the strata of organic limestones.

Thus his thoughts rambled on, and before he realized it the dawn came. The solar disk, smaller but brighter than the one we know, shone through red streamers of wind-torn cloud. For an hour Kor Situ was busy making observations of it, trying to determine more accurately just when the titanic forces straining within it would burst their bonds. Then, exhausted, he slept.

Eight days passed. During this time storms became increasingly frequent and violent. The atmosphere bore terrific charges of electricity, so that, as Kor Situ had predicted, there was deadly danger in venturing from the protection of buildings not equipped with metal pinnacles and cables to conduct the charges into the ground. The moment of doom was near.

On the eighth day the folk of Tyblani took refuge in the deepest cellars and vaults. Only a few learned ones, knowing that the end was inevitable, whatever they did, stayed on the surface to observe. Kor Situ was, of course, among this bold minority.

HE REMAINED in his laboratory. Almost at high noon on the ninth day, the real catastrophe began at last. At that moment, Kor Situ was crouching directly beneath a window in the roof, through which he could see a large portion of the sky. The sun was directly overhead, faintly visible through the

milling clouds. Things happened very abruptly.

Through the veil of clouds the scientist saw curious, irregular upjettings, like thick, fiery fingers, projecting outward from the solar photosphere. They lengthened, and spread at the extremities, with a motion that was visible, but seemingly slow at this vast distance. The sun appeared to rip open at the center, and through the jagged, widening rift glared an intolerable blue incandescence that the clouds above could scarcely obstruct at all. The radiated heat and light increased with the abruptness of a tidal wave.

Kor Situ, singed and blinded, scrambled out of the path of the sunshine beneath the sky window, and blundered to a lesser window in the wall.

After several seconds his vision was restored enough so that he could see the foliage of fantastic trees, in the city and on surrounding mountain slopes, bursting into flame. The fine filaments which were his ears, detected an ominous hissing. Everywhere, wisps of angry steam were rising from the wet ground.

It was the beginning of the end—only the beginning. What was yet to come would be inconceivable. The gases thrown from the sun had by no means achieved their maximum velocity as yet, and it would be some little time before their first fierce wave of tenuous hell reached outward as far as the orbit of Tyblani. Yet Kor Situ could feel the temperature of the atmosphere around him mounting rapidly. The tingle of electrical discharges made his flesh pucker, as if pricked by a million tiny needles. Kor Situ was prepared for death.

And then, all at once, he noticed an entirely incomprehensible waning of the intolerable solar glare. Blue flames, like monstrous electric sparks, were spurting up from the mountain peaks in the distance. He thought at first that this

phenomenon was nothing but lightning of the kind that had riven the world for weeks; but now he saw that there was something strange about it. Where it vanished in the sky, a blue veil of mysterious fog seemed to thicken and spread. The substance of the fog—if substance it may have been said to possess—grew swiftly denser and more opaque. In a matter of minutes the fearful blob of the exploding sun had faded to but a dim, silvery ghost.

Then it vanished altogether. But there was still light. A soft, milky luminescence, which must have represented only a tiny percentage of the fierce solar rays, sifted through the screen of strange mist that now enveloped the entire firmament, and hung at an indefinite distance above the natural clouds.

What was this miracle that had happened? How had it been brought about, and by whom? Kor Situ crept dazedly to his radio. He moved switches and controls. Generators which he had thought would never be called upon to work again, whirled out their song of power. In a moment Kor Situ was talking with his fellow scientists in various parts of the world. Questions and information flew back and forth amid the growl of static.

Everywhere the same thing had taken place. The strange mist, born of blue flame that leaped from the ground, was world-wide, shielding Tyblani, on its daylight half, from blazing catastrophe, and hiding the stars from view on its darkened hemisphere.

THREE DAYS brought little change in conditions. Destructive storms became less and less frequent, with the waning of the electrical charge in the atmosphere. That was all. Scarce daring to hope, yet optimistic, the inhabitants of the planet took up once more the normal threads of their lives. Theories were formulated as to the na-

ture of the screening mist. It must be something that reflected most of the sun's light back into space, at the same time repelling the rarefied but tremendously heated gases of the solar photosphere.

Kor Situ did not mention his brief contact with outside intellects, though intuition told him that they must somehow be involved with the amazing phenomenon that had saved his kind. But he remained patiently beside his wireless apparatus, keeping his receiving instrument constantly tuned to the wave length which the mysterious ones had employed. That nothing came of his devotion was surely not his fault.

Understanding was brought to him in a different manner. No one saw the arrival of the visitors from the underworld, for the car that bore them penetrated to the surface of Tyblani in a deserted gulch, several miles from the city.

They had no trouble in locating Kor Situ, however, for their direction finders had long ago enabled them to determine exactly the position of his laboratory by means of the radio waves that came from it.

He dropped senseless before the numbing impulses of their weapons, before he knew that his sanctum had been invaded.

They carried him into a slender flying machine. The craft winged its silent way from the roof top of the building in which he dwelt, back to the gulch from which it had come. There, poking its blunt nose up from the ground, was the great drill-like car that had bored its way up from below.

Once more aboard the metal mole, the visitors thrust slender needles deep into the unconscious Kor Situ's flesh. Since the instruments were sterilized and very carefully handled, the injury they caused was negligible. Thus the godlike ones located the Tyblanian scientist's brain. Delicate mechanisms came into play, and

the deepest secrets of Kor Situ's mind were unmasked to his captors.

"Interesting," said one of them mildly. "We should have investigated these folk of the surface centuries ago."

"Now is soon enough, Gorg Willam," another replied. "They have nothing that we want. Their intelligence is of no higher order than that of our ancestors of the first cataclysm, and their science is even inferior to that of the forefathers of our race. Interfering with these simple creatures in any way, or maintaining any permanent contact with them, would doubtless do them more harm than good. It is best that each race or species develop its civilization independently, and on its own initiative. Doubtless an ice age will come to this world when the nova has passed and the sun is readjusting itself; but I think these beings have sufficient intelligence and ingenuity to meet and master any new conditions they may be required to face."

"Perhaps you are right, Fran Anroo," the first speaker replied. "But this individual we have taken for scrutiny—he knew of the approaching solar explosion even before we radioed him our warning diagram, which he interpreted so cleverly and sent back to us in a different form. We need not have troubled with the diagram at all; for, working entirely on his own judgment, he pointed out to his people the danger there would be—the certainty of destruction, rather—for he did not know that the result would be otherwise. As a result, his kinfolk took cover, which was necessary during the first moments of the sunburst. It is a healthy sign of mental progress here on the surface, Fran Anroo. The whole story is written in the memory of our subject."

"You are correct in all that you have said, Gorg Willam," Fran Anroo answered. "Yet you prove my claim of long standing that these creatures are at their best when left alone and un-

guided as much as possible. Of course, I am sympathetic. Of course, I am glad that in protecting our homes from possible annoying circumstances, we also saved these queer, aspiring animals. In many ways they are so like our ancestors of the past. Still, I suppose, it would do no harm to give our specimen here a chance to learn about the older history of his planet."

When Kor Situ of Tyblani regained his senses, he saw bizarre, monstrous bipeds, with gentle eyes, standing around him. Their bodies were muscular, their heads huge and bulging. When they spoke he understood some of what they said, for with their marvelous magic they had stamped a portion of their language into his brain.

FOR SEVERAL HOURS they kept him with them, though they seemed to pay him scant attention. But he could listen to their conversation. Among other things still more miraculous, he learned that far beneath him was a Utopian world of artificial caverns wherein they dwelt. There, now, colossal machines were throbbing to maintain the protective screen around Tyblani. Those machines would be busy for several months at least, until there was no longer any danger from the blasts of the nova.

Kor Situ watched from a window of the metal mole, while these wizards, from a region lying close to the internal fires of the planet set up intricate instruments on the seared soil of Tyblani and took tests of the invisible sun above. Somehow these demigods, though they lived in a buried realm, had discovered the titanic solar threat, even as he. What sort of apparatus had they used to make this discovery through vast distances of solid rock? Or had they testing stations located close to the surface? Or had they some way of predicting, by mathematical means, just when a new nova of the sun would take

place? Humble with awe, Kor Situ ceased to speculate.

At dusk, those of the visitors who had ventured from the subterranean car reentered it, bringing all their equipment with them. Kor Situ was gently pushed from the vehicle. The doors clanged shut behind him, making him feel curiously outcast. A minute later the great mole's propulsive machinery began to grind in reverse. Its nose retreated beneath the surface. The adventurers from below were returning home. Perhaps never again would they visit the outer shell of Tyblani.

Kor Situ, awed, weary, a trifle disappointed at his ejection, yet happy to the point of ecstasy, began his slow, crawling march through drizzling rain, back toward his native metropolis. It was almost dawn before he reached the edge of the city, and secured a two-wheeled cycle on which he rode the rest of the way to his laboratory.

EXHAUSTED though he was, there was one thing which he must accomplish before he could think of sleep. Much incredible information must be made known to the world.

Crouching before his radio microphone, he began to speak.

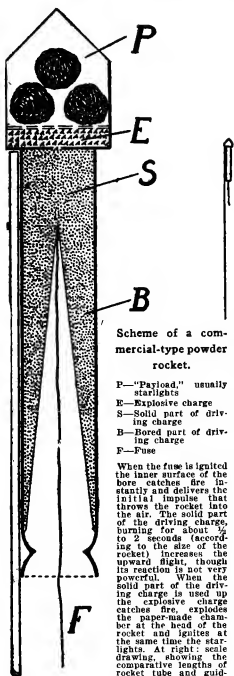
"Friends, everywhere," he said, "Tyblani is far older than we thought. Today there is life on its crust that is incredibly ancient. But before its time there was other life, antedating, by countless ages, that of our oldest known fossils. That first life thrived, and it produced a race of beings equal to us in intelligence.

"Then came a nova, like the one of now. Warned soon enough, a few of those people of the past bored far down into the planet's crust, and managed to survive the first cataclysm. Every other living thing that was not under their protection perished. The world became as new again, on its exterior. Dust from that other solar explosion settled to its surface, burying all evidence of ancient glories. Then our known biological history began. Here we are the dominant species.

"But the children of the rulers of the past still live in their wondrous, buried cities. Their knowledge and their brain power are beyond our comprehension. Yet they still call themselves 'men,' and their name for Tyblani is 'earth.'"



The Dawn of the



Scheme of a commercial-type powder rocket.

- P—"Payload," usually starlights
- E—Explosive charge
- S—Solid part of driving charge
- B—Bored part of driving charge
- F—Fuse

When the fuse is ignited the inner surface of the bore catches fire instantly and delivers the initial impulse that throws the rocket into the air. The solid part of the driving charge, burning for about $\frac{1}{2}$ to 2 seconds (according to the size of the rocket) increases the upward flight, though its reaction is not very powerful. When the solid part of the driving charge is used up the explosive charge catches fire, explodes the paper-made chamber at the head of the rocket and ignites at the same time the starlights. At right: scale drawing, showing the comparative lengths of rocket tube and guiding stick.

THE CASE of the rocket ship is a peculiar one.

It does not yet exist, but many thousands of people feel certain that there will be a day when the first rocket ship leaves the Earth in an attempt to reach interplanetary space, later to soar to the Moon and to the other planets.

Thus we have—with the possible exception of flying machines—for the first time in history a machine that is popular even before its actual invention. This is an extremely rare case. Normally a machine has to be invented first and has to be brought to a comparatively high degree of perfection before the fight for general recognition and—if suited for it—for general use can be started.

Rocket ships, however, are popular even before they exist. They occur in the movies; they are comparatively abundant in the daily and periodical press and on the radio, and they are an every-issue event in a good many magazines. I do not dare to prophecy exactly when the first rocket ship will be built. But it is safe to prophecy that at that time there will be a great many people who will declare emphatically that it should have been done a long time ago.

In spite of this wide and constant interest, it has to be stated that the conceptions of very many enthusiasts are somewhat hazy or slightly out of focus. And it is for this reason that any discussion of rockets and rocket ships still has to be started with the basic principles, as they are incorporated in the ordinary commercial skyrocket. A skyrocket shows all the essential parts of more elaborate liquid-fuel rockets in rudimentary or embryonic state. It consists of fuel supply, pay load and

Conquest of Space

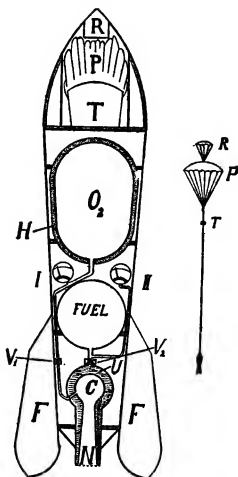
**An outstanding
article on rockets.**

by **WILLEY LEY**

guiding device; it even shows a primitive exhaust nozzle, the main part, or one of the main parts, of a rocket motor, and it is sometimes equipped with a parachute, which is still the best landing device ever devised for rockets.

That the assembly of all these parts is pitifully inefficient is mainly due to the fact that skyrockets were invented before scientific designs were heard of, and that they have hardly changed in shape, size or method of manufacture since then. We have an Arab manuscript preserved which was written around the year 1280 A. D., the uncertainty factor in this date being about five years. Its author was an Arab scientist, the hunchback Hassan Alrammah. This man, who appears to have been of extraordinary brilliance, was called "Nedshim-Eddin—Star of Faith"—by his contemporaries. In his manuscript he described at length everything known about rockets in his time and country. The invention was then new in the Mohammedan west, so new that Hassan did not even have an Arab word for rocket, and had to call rockets *al-sichem alkahatai*—Chinese arrows—but there is hardly a difference between Hassan's powder rockets and those of the nineteenth century.

IT TOOK about four hundred years until it was discovered why a rocket moves. The discoverer of the natural law underlying the principle of the rocket was Sir Isaac Newton, who termed it his Third Law of Motion.



Scheme of an instrument-carrying,
liquid-fuel rocket.

- R—Parachute releasing mechanism that pushes the pilot parachute out of the rocket in a given instant
- P—Parachute, folded up
- T—Compartment of instruments
- O₂—Liquid oxygen
- H—Heat insulation of the oxygen tank
- I—Oxygen pressure gauge
- II—Fuel pressure gauge
- V₁—Oxygen valve
- V₂—Fuel valve
- FF—Fins
- C—Combustion chamber
- N—Exhaust nozzle
- U—Fuel jacket around the rocket motor for cooling.

A few minor details, like inflill and safety valves, reinforcing struts and similar things have been omitted for the sake of clarity. At right: How the rocket will return by parachute.

His definition says, in effect, that action and reaction are equal in power, but opposite in direction. This statement, for which any desired mathematical and experimental proof can be furnished—and *has been* furnished—includes a number of other unspoken statements, the most important of which are the following:

1. That reaction must occur independent of the surrounding medium, no matter whether the rocket is surrounded by air, by an inert gas like nitrogen or by nothing at all.

2. That any expelled mass creates a reaction, no matter what its nature. (This sounds perfectly obvious to us, but up to Newton's time it was believed that only gunpowder could produce the effect.)

3. That high exhaust speed is of greater importance than ejection of large masses.

4. That the velocity of rockets may surpass the velocities of their exhaust.

It has to be remembered, however, that these conclusions were not drawn at once; in fact, they were hardly known before rocket theory was evolved by the Russian scientist, Konstantin E. Ziolkovsky (1903), the American physicist, Dr. Robert H. Goddard (1919) and the German mathematician, Professor Hermann Oberth (1923).

The first of these four proven statements gives us the right to investigate the possibilities of rocket propulsion with a view to exploration of the stratosphere. The second allows us to select any fuel that seems promising, may it be gunpowder or dynamite, steam or monatomic hydrogen. The third statement urges us to find fuels with very high exhaust velocities; the choice among these is then only limited by considerations referring to practical points of view, such as safety, chemical stability, expense and similar questions. The fourth statement, finally, allows us to expect any velocity desired, if we can only manage to construct our rockets in a way that they are able to carry the necessary amount of fuels.

It can be said that these theoretical investigations are practically finished. The mathematical part of them has been treated most extensively, and, for the time being, conclusively by Oberth; the chemical part—mainly concerning fuels—was done to a good extent by chemists before liquid-fuel rockets were discussed at all, and had only to be adapted sensibly to the new requirements. The problems still to be solved are difficulties of actual construction. Others are not known to me, except—I am sorry to mention this point—a certain ridiculing attitude of certain people, and—*very* sorry now—the problem of financing the work.

After rocket theory had proved that there was something to be expected from a device which had been known but, at the same time, lying dormant for centuries, actual experimentation was begun. It started—aside from Dr. Goddard's work, which was kept in unnecessary secrecy for many years—in 1928 in Germany. Experimental progress, however, did not follow a single path. There were, seemingly, two ways to achieve results, and both found defenders. This soon resulted in the formation of two distinct parties, commonly referred to as the wet and the dry party.

These appellations do neither refer to the state of mind of the experimenters, nor to their political colorations with a view to prohibition, but to the nature of the fuels used by them in their experiments.

THE DRY PARTY, using powder for fuel, had a seeming advantage in the fact that actually flying powder rockets were manufactured commercially. They were admittedly inefficient, but the task of the experimenters was to increase the rockets in size, to find a more powerful powder for them, to eliminate as much of their dead weight as possible, and to **make** the combustion and the

handling of the comparatively large quantities of powder safe.

Considering all points, it can be said that these experimenters failed in their task. They succeeded in increasing the size of powder rockets, but it seems that they soon reached the possible limit. They also succeeded in using a more powerful powder as a fuel, but since the increased size implies a very great increase in the pressure necessary to compress the driving charge, a new danger factor in manufacture was created which could be overcome only with the best of equipment and the most experienced and most skilled labor. In fact, it is said—and probably rightly so—that only one man could make these large powder rockets and survive: Fred-eric William Sander in Wesermünde.

The dry party did not succeed in eliminating dead weight; in fact, they were forced to use heavier tubing, and in general heavier construction while increasing the size. And they failed utterly in making these large rockets safe. Approximately half of all rockets used in the so-called Opel experiments with rocket cars and rocket railroad cars, exploded. The dry party ceased to exist when, in October, 1933, Reinhold Tiling's* laboratory blew up, killing Tiling himself, his assistant Friedrich Kuhr and his secretary Angelika Buddenböhmer.

In order to understand the most important arguments of the wet party, which dominates rocketry entirely now, it is necessary to go back to theoretical considerations again.

It was mentioned that high exhaust speeds are more important than large exhaust masses. Liquid fuels happen to have higher exhaust velocities than solid fuels. The exhaust velocity of gases resulting from the rapid combustion of ordinary rocket powder amounts to little more than 2000 feet per second. The

exhaust velocity of the gases resulting from the combustion of gasoline and oxygen amounts to approximately 6000 feet per second. The exhaust velocities of marsh gas—which is liquefied, like oxygen always is, to facilitate the use of large quantities—is still somewhat higher. The exhaust velocity of alcohol and oxygen is about the same, while the exhaust velocity of liquid hydrogen and liquid oxygen approaches the theoretical limit of about 16,000 feet per second.

THE other advantages of liquid-fuel rockets are really obvious.

In powder rockets fuel tank and combustion chamber are the same; therefore, there is always the possibility that the supply of fuel explodes all at once. In liquid-fuel rockets fuel tanks and rocket motor—i. e. combustion chamber and exhaust nozzle—are separated. This allows a place to insert valves, preventing the flame from flashing into the fuel tanks. Even without such valves it is very unlikely that the flame from the combustion chamber could perform this trick, since the fuel lines are narrow and because there is only one of the two liquids present in each line. Naturally, alcohol or gasoline cannot burn without any oxygen, and oxygen alone is also harmless.

The rate of combustion cannot be regulated in powder rockets, or only to a very slight extent in using various kinds of powder. But it is very easy to regulate the rate of combustion in liquid-fuel rockets. It can be done either in changing the size of the fuel lines, in applying various rates of pressure in the fuel tanks, or in using regulating valves. It is also possible to stop combustion completely in liquid-fuel rockets, a problem which is practically unsolvable as far as powder rockets are concerned.

One of the greatest disadvantages of powder rockets is the short duration of thrust. In ordinary skyrockets it ranges—according to size—from one tenth of a

* Reinhold Tiling (the name is pronounced Teelink) invented the so-called winged powder rockets without parachute.

second to one and a half seconds, and only specially manufactured rockets burn for 20 or 25 seconds with comparatively low thrust. The duration of thrust in liquid-fuel rocket motors is dependent only upon two things: the amount of fuel available and the resistance of the combustion chamber. Both are problems of construction which can be solved and which have been solved already to a large extent.

A long duration of thrust is desirable to attain a high efficiency. A rocket is more efficient the faster it moves; the highest efficiency (100 per cent) occurs when the velocity of the rocket and the velocity of exhaust are equal. Since exhaust velocities are high—and have to be high—it is obvious that the rocket needs some time to attain a velocity somewhere near the velocity of exhaust. The longer the duration of thrust, the more efficient the rocket, generally speaking, and the lower the acceleration the rocket and its pay load—whether the pay load consists of instruments or of live beings—has to stand. Naturally, instruments that do not have to stand high accelerations do not have to be very massively constructed, which also helps to eliminate dead weight.

In addition to all this, it is desirable to keep the speed of the rocket comparatively low—in spite of bad efficiency—during the first 6 or 7 miles of its ascent. It is these first 6 miles above sea level that contain approximately 75 per cent of all air and which offer most of the air resistance to be overcome by the rocket on its flight. To keep air resistance low also necessitates a long duration of thrust. To make the rocket most efficient it is desirable to increase acceleration above this layer, which means a change in the rate of combustion. All this cannot possibly be done with powder rockets, while there is no reason why it could not be done with liquid-fuel rockets.

Practical rocket experimentation,

working along these lines of thought, has already achieved a good many results which may be summed up as follows: Professor Goddard, after investigating the possibilities of improved powder rockets finally turned to liquid fuels and made a long series of experiments of which, unfortunately, nothing is known. His very brief report, which was published by the Smithsonian Institution recently, only states that he made a number of flights with gasoline-fueled rockets, his altitude record being 7500 feet.

The American Rocket Society made two rocket flights and a series of very interesting ground tests with rocket motors on a proving stand, registering thrust, pressures, fuel consumption, etc. Similar ground tests were made by the Cleveland Rocket Society, but while the American Rocket Society published accurately the results obtained, the results of these other tests are not yet known.

JOHANNES WINKLER in Germany, who originally founded the German Rocket Society, of which Professor Oberth was president and myself vice president, built the first liquid-fuel rocket in Europe that actually flew, in March, 1931. It was propelled by liquefied marsh gas and liquid oxygen, and reached an altitude of approximately 2000 feet. His second and much larger rocket was less successful. A few feet above the launching rack, either a minor explosion occurred that ripped of one of the fuel lines, or one of the fuel lines broke, which resulted in a minor explosion. Due to this mishap the rocket motor ceased firing; the rocket fell back and was destroyed by the impact on the ground.

Dr. Eugen Sänger of the University of Vienna conducted a series of ground tests with rocket motors. This series was not meant to lead to the construction of a flying rocket, but was made for purely scientific reasons. Dr. Sänger

succeeded in obtaining extremely long durations of thrust. His best result was a thrust of approximately 55 pounds for a period of 20 minutes.

The credit for the most extensive research still belongs to the German Rocket Society, which worked experimentally from August, 1929, till June, 1933, on its own proving ground near Berlin, the so-called Raketengußplatz. During this period we built: four proving stands, one for the Miraks—the first type of liquid-fuel rockets we built—one for rocket motors alone. This was the second or large proving stand; it served for most of the ground tests. Proving Stand No. 3 was also only for rocket motors, but portable. It was not often used. Stand No. 4 was for complete rockets of the heaviest type.

About 490 ground tests were made on these 4 proving stands, and about 95 rocket flights. To these flights, 6 flights of an especially heavy type of rockets, built for a demonstration contemplated by the city of Magdeburg, have to be added. These heavy "repulsors," as I had termed them, weighed more than 200 pounds. They reached altitudes up to about 2400 feet. The lighter repulsors still hold the records for liquid-fuel rockets. They ascended about two miles and covered, once, a distance of three miles. This was highly unwanted, since the proving ground was so near the city. For the same reason, we had to resist all temptations to prepare a real altitude shot.

Though rocket experimenters still have occasional trouble with minor nuisances like leaking valves, melting nozzles, and freezing feed lines, there can be no doubt that the main problems are solved. Rocketry is now about as far as aviation was some 30 years ago. There exists a pretty complete theory—much more complete than the theory of aerodynamics 30 years ago. There exists a comparatively large amount of practical experience, and there

are already quite a number of successes on record.

THE QUESTION now arises what should be done next.

I think that the first practical application of liquid-fuel rockets will be what is termed the "meteorological rocket." This term means a rocket able to reach altitudes of about 15 miles and capable of carrying scientific instruments to these layers of the stratosphere that have only occasionally been reached by unmanned, so-called "sounding balloons."

Meteorological rockets have to be constructed in a way that a timing device throws out a tiny parachute at the top of the flight. This parachute pulls a larger one from its container, which, in turn, brings the instruments in the open. Then the whole assembly will descend slowly by parachute, the empty and now comparatively light rocket first, then the instruments, and finally the parachute. During the descent, the instruments are busily taking their data and recording them, while a small and light radio device emits a shrill radio "scream," which allows one to trace the rocket during its drift by parachute. Such a device is necessary, because a rocket soon disappears in the sky. Even our heaviest repulsors were hardly visible to the naked eye at so low an altitude as 2000 feet.

The data taken by these rockets will probably aid very much in weather forecasting and will be very valuable for the study of certain problems of flying, especially stratospheric aviation, which is due to come in the near future.

The next application of rockets will probably be in the transportation of urgent messages and mail, first over short distances and later, when the necessary experience has been gathered, over long range. Such a long-distance mail rocket—if launched vertically—would be able to attain altitudes beyond the limits of our atmosphere.

This possibility now leads to the last question—that of interplanetary travel.

To state it bluntly: we do not know any reason why it should not be done. At the same time, we know very definitely how much practical experimentation is still necessary, and how much experience has still to be gathered before the construction of the first passenger-carrying rocket could be undertaken. And from the first passenger-carrying rocket it will still be a long way to the first space ship. But it is possible, definitely possible. We know from experiments undertaken in Germany that men are able to stand the accelerations involved. As far as air-purifying machinery is concerned, we have the necessary experience from the constructions of submarines. That the necessary amounts of fuel and of foodstuffs can be carried is proven mathematically.

THE WHOLE PROBLEM is a problem of speed. A stone, falling from a height of a hundred yards, attains a certain speed. It takes the same velocity to throw the stone a hundred yards high. The greater the height, the greater the velocities involved. But the velocity of a stone falling from an infinite height does not become infinite. It reaches a certain value which is dependent only on the mass of the planet and its radius. In the case of the Earth this value is 11.2 kilometers per second, or approximately 7 miles. This velocity has been termed the "parabolic velocity" or the "velocity of liberation."

Whether a rocket ship will be able to leave the Earth is therefore answered by the question of whether it is able to attain a speed of about 7 miles per second.

To answer this question needs higher

mathematics, but it is, nevertheless, possible to explain the answer in a simple way. There is a symbol called "e." Its exact value can only be expressed by means of a formula*, but for all practical purposes it is sufficiently accurate to use the approximate value, 2.718.

If a rocket is capable of carrying e times its dead weight in fuel, its velocity, after all fuel is consumed, will be equal to the velocity of its exhaust. If a velocity of twice the velocity of exhaust has to be reached, the amount of fuel to be consumed has to be e^2 times the dead weight. If thrice the velocity of exhaust is desired, the amount of fuel has to be e^3 times the dead weight of the rocket. "Dead" weight in this connection means the weight of the rocket itself, plus passengers and all provisions. If a rocket, fully equipped and with passengers on board, but not yet fueled, weighs 10 tons, it has to carry about 27 tons of fuels to attain exhaust velocity, about 74 tons of fuels to attain double exhaust velocity, and about 201 tons of fuels to attain triple exhaust velocity.

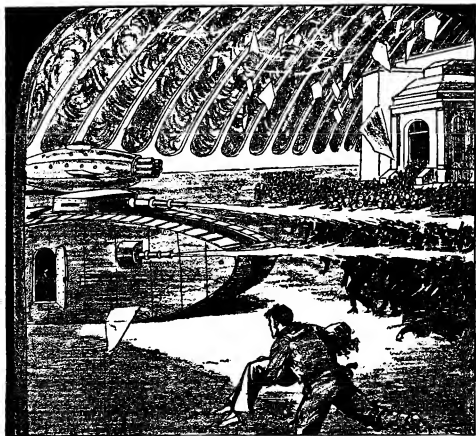
Whether this can be actually constructed cannot be answered on purely theoretical grounds, though I put emphasis on the fact that theory, as far as it can answer the question asserts that it is possible.

For the time being, however, the attention of rocket engineers centers upon construction and design of the first meteorological rocket, which will introduce a new branch of engineering science in everyday life. We know that this new branch offers amazing possibilities, and we have every reason to believe that there will be no stop to the development of rocketry until all these possibilities are actual facts.

* The formula reads:

$$e = 1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \frac{1}{4!} + \dots = \lim_{n \rightarrow \infty} \left(1 + \frac{1}{n} \right)^n$$

approximately 2.7182818284 . . .
(4! for example means 1x2x3x4)



Clouds Over Uranus

*And both Murder and Madness begin
with an "M."*

by R. R. Winterbotham

TWO FIGURES clad in the bundlesome, vacuum-lined garments so popular among traders and explorers on the outer planets, disembarked from a space schooner at the locks of the glass-inclosed Terrestrial outpost of Uranus.

The Sun, 19.7 times as far away from Uranus as it is from the Earth, was barely a disk. Still the brightness of

the father of the universe was about 1,800 times that of the full Moon shining upon the Earth, the Sun's favorite daughter.

But the Sun lacked heat, such as the two from Earth knew. Doug Fisher, whose hawklike visage was nearly hidden behind his transparent face covering, could feel the heat leaving his body radiated even through the vacuum lining

of his clothing. He was more accustomed to the warmth of Martian and Terrestrial laboratories than to the brittle frigidity of Uranian climate, ranging to 300 below zero and colder.

Even furs could not disguise his companion's feminine charm. Her figure, bundled like a Mongolian coolie in winter, was tall, straight and savagely lithe. Her eyes burned with a fierce determination. She was Kathryn Abbot, known throughout the Sun's universe as the sister of the man convicted of the most sensational murder ever to have split the pages of interplanetary history.

She seemed not to mind the atom-slowing chill that plunged icy daggers into every living cell. With head erect, she marched to the locks. She was followed by Doug, who carried two small satchels. She threw up her hand to intercept the infra-red rays that worked the electric-eyed mechanism to the outpost gate.

A section of the transparent wall rolled back and the warmth of the inner chamber rolled out upon the two. Doug followed the woman into the locks. The door closed behind them. Instantly the two were bathed in warmth. Kathryn removed the hood from her face and head. Her coal-black, glistening hair fell in waves over the collar of her suit, made of expensive Martian erlita fur.

Doug turned his eyes back for an instant to watch the schooner that had brought them from Mars rise into the dense Uranian atmosphere. The captain and crew of the vessel deigned to take off without even paying respects to the garrison of this accursed outpost.

"Back to Mars!" Kathryn whispered. Her voice betrayed her thoughts, traveling back across a billion-mile gulf to the red, canal-gutted planet upon which her brother awaited a rendezvous with the executioner.

A feeling of intense loneliness swept over Doug as he watched. On the hori-

zon hung a foreboding cloud that seemed to increase the loneliness by its very un-Earthly shape.

"Green clouds!" he muttered.

"Cold and twilight!" added Kathryn, seeming to read his mind. "And my brother lived here two years. It would drive any one to——"

"—madness!" Doug broke in suddenly as he saw her lips compress for the final word of the sentence. Both murder and madness begin with an M.

When the vestibule temperature reached 68 degrees above zero, the inner locks opened. Doug and Kathryn stepped through the opening and came face to face with the entire Terrestrial population of Uranus.

Three persons—two men and a woman—eyed the two visitors, suspiciously, leeringly and with resentment. Behind them stood three other beings, human only in form, black as the night of space, half-fierce, half-comic, toothless, red-eyed and expressionless. The three were Mott, Kinn and Duth, the only living creatures on Uranus ever to have befriended man.

"Greetings, fellows of the Earth!" The tallest of the three human beings stepped forward. He wore rags that had once been a uniform. "I am Major General Lancer, commandant of the Uranian post."

His hair hung in shaggy strings down the side of his head. He was blind in one eye, the sight of which had been lost from severe frostbite in the Uranian atmosphere.

"The radio has informed me you came here to see if I spoke the truth concerning the murder of Vanguard McMurray, for which young Bill Abbot was convicted nearly a Terrestrial year ago."

There was a sarcastic note in the leering voice. As the major general spoke a shrill burst of laughter came from the woman, Marg McMurray, the flaming, red-headed widow of Vanguard Mc-

Murray. Her hands rested on her hips. Her shoulders hunched forward like a cat ready to spring.

Marg opened her mouth, but she was checked from speaking by the third member of the party, who laid his hand roughly on her arm. The man was as uncouth as the others, a huge muscle-bound giant, known from Mercury to Pluto as "Soapstone" Davis, a mongrel who had fought in the space wars of two decades. His face—such of it as was not knotted into an ugly scar burned from the spark of a heat gun during the storming of Io—bore the stamp of cruelty. His high cheeks showed Tartar blood, his thick lips and dusty color evidenced a Negroid strain and his eyes were the milky blue of the northern races. He was bald as an egg.

Doug's eyes met the lone eye of Major General Lancer. "On the face of it," began the arrival, "it looks as if I came here to pin something on one of you three—you six, rather. Forget it. I was not satisfied with the verdict of the courts, sentencing Bill Abbot to the death ray. No one was satisfied. I came merely to clear up the case. This is Miss Kathryn Abbot, Bill's sister. If none of you are guilty, you have nothing to fear."

General Lancer shrugged. "There never was a conviction without some feeling that justice had gone awry. Perhaps there were extenuating circumstances"—the commander's eyes turned slyly toward Marg, whose lips again were cracking into a crooked smile—"but—never fear. I'll give you full co-operation. I'm sure none of us have anything to fear from your visit. Show these people to their quarters, Soapstone."

THE OUTPOST had quarters for five hundred men. Only two or three times since it had been built, two centuries before, had it ever been fully manned. These times had been in

periods of bloody interplanetary wars. At present the residents of the outpost served only to keep the post in repair. For some reason no nation of the Earth, nor of the solar system, had considered Uranus a prize worth conquering.

Soapstone led Kathryn to a barracks which she was to share with Marg McMurray. It faced the quarters of General Lancer across the parade ground of the outpost.

As Kathryn left him, Doug squeezed her hand reassuringly. "I'll be in the barracks to your left, if you need me," he said. "There is a radiophone connection."

She tossed her head, angrily shaking her black hair over her furred shoulders. "I'll need no help to take care of myself," she said, patting the heat gun strapped at her side. "I can handle even that vixen. What a place! No wonder there was a murder. But why Vanguard? Bill could have done humanity a service had he slain any one else on this forsaken orb—if he was guilty of killing, which I doubt. Any one here is a likelier suspect in a murder than Bill. He—he, and Vanguard—were the only decent things on this planet!"

"Yer fergittin' Mott, Kinn an' Duth," chortled the hideous giant. "Them's fine people, them Uranians."

He laughed loudly at something he seemed to think was a huge joke. Then he led Doug to his quarters.

The Uranian outpost was one of two built near each pole of the seventh planet. It was fully equipped with modern conveniences, both for living and fighting. Like the companion outpost at the south pole, the northern fortress was occupied for only one half of the Uranian year, which consisted of eighty-four Earth years.

There were several reasons for the seasonal occupancy of each post.

In the first place, the rotation of the planet, once each eleven hours, upset the Terrestrial schedule of daylight and

darkness so greatly that a decision was made by early explorers to build near the poles, where constant conditions reigned half of each year, due to the inclination of the axis of the planet.

The forty-two-year period of continuous daylight during summer at each pole had an added advantage of bringing warmth, although that warmth was far below Terrestrial standards. The period of continuous daylight at each pole sometimes raised the temperature to less than minus 200 degrees Fahrenheit in midsummer.

Such a temperature, it was found, was necessary for safety. Man was able to protect himself from the cold, but not from conditions caused by the cold. Oxygen liquefies under ordinary pressures at minus 327 Fahrenheit and air liquefies at slightly lower temperature. On Uranus, however, with its higher atmospheric pressure, any temperature above 300 degrees below zero is likely to bring rains of liquid oxygen. At the equator, scouting parties had observed hailstones of solid oxygen.

Where liquid oxygen is plentiful, even the smallest exposed fiber of cotton becomes a great hazard. Cotton moistened with liquid air explodes with the violence of dynamite. A spark from a hobnailed boot, even static in uniforms, is enough to set off the oxygen-saturated cotton. Nor is cotton the only dangerous material. Many other things explode or react violently. Metals are particularly dangerous. Aluminum will burn with liquid oxygen in a blinding flash, with a temperature rise from minus 300 degrees to nearly 5,000 degrees above zero in a fraction of a second.

DOUG FISHER, scientist, interplanetary traveler, adventurer, slept the sleep of a babe. It was a deep, dreamless sleep into which he had fallen as he touched the rude army bed in the Uranian outpost barracks.

Then, through the swirling darkness of his slumber, an icy chill struck his consciousness. Some nameless horror seemed to rise from beyond the abyss of his dreams and remain with him as he awakened.

Wakefulness coursed through his veins in a dizzy rush. Despite the darkness of the room he could see swirling mists as he opened his eyes. The fog was there an instant, then was gone like a puff of smoke in the wind. It was not the sight of the fog, but the feeling of *a living presence* in the room that made his flesh crawl.

Sleep had dimmed his vision at first, and when he fully opened his eyes the evanescent mist had gone. But it was no dream. A warm, moist smell, like that of a hothouse on Earth, pervaded the bedchamber. Some nebulous something, gaseous something, had been in the room, whether to do harm or merely to observe, Doug did not know.

At once his thoughts turned to Kathryn. He sprang from bed and rang her quarters by radiophone. A sleepy voice answered.

"Yeah?"

"Mrs. McMurray? This is Doug Fisher. I wondered if Kathryn is all right?"

"Aw nuts! She don't need a nurse-maid. Whatsa matter? Been havin' a nightmare?"

"I'm sorry. I was disturbed and I became uneasy about Kathryn."

The receiver clicked in his ear. A nightmare? Doug's nostrils still caught the delicate, but somewhat sickening smell. Then it struck him as decidedly queer that Marg McMurray should ask if he had been having a nightmare.

BECAUSE the Uranian outpost was inclosed by the glassy dome, artificially heated and without weather, only the sleeping quarters were roofed. Doug

found that Vanguard McMurray's laboratory, undisturbed since the day he was slain a Terrestrial year ago, was on the order of an inclosed courtyard.

McMurray, primarily an army surgeon, was a biologist by avocation. At the time of his murder, McMurray had been engaged in an extensive study of the three anthropomorphic aborigines of Uranus. Some of the results of his investigations had been radioed to scientists on the Earth, Venus, Mars, Jupiter, Saturn and the inhabited satellites. Most remarkable of McMurray's discoveries was that the Uranians had no bones. The manlike creatures seemed to be made of a stiff, leathery cartilage which failed to disclose itself in X-ray photographs. Dissection was, of course, impossible.

"Rubber dolls of Uranus," McMurray had dubbed them in his radiograms. But photos of Mott, Kinn and Duth, which had been sent from Uranus, showed the creatures to be anything but dolls in appearance.

Hoping to find the key to McMurray's slaying, Doug visited the laboratory. For more than an hour Doug searched through personal papers of the murdered man. He found nothing, nor had he expected to find a great deal. All of these papers had been examined by army officials from Mars as soon as the death of Vanguard McMurray had been reported.

McMurray had been brutally clubbed to death in his laboratory. Blood-smearred clothing had been found among Bill Abbot's belongings. The club was hidden in the barracks where Abbot lived. Abbot and McMurray had not been on the best of terms, due principally to trouble stirred between them by Marg, Vanguard's wife.

McMurray's papers dealt extensively with the sub-human creatures of Uranus. They possessed a fine degree of intelligence. They were good workers and so far as known had never

attacked an Earthman. McMurray had found out little concerning their culture or where other members of the tribe lived. Questions concerning their race were always answered by Mott, Kinn and Duth with shakes of their heads and shrugs of their shoulders.

A personal diary was found. It consisted principally of accounts of his work. There were veiled references to trouble with Marg and indications that Bill had attempted to persuade McMurray to send her away. On May 12, 2172, one month before McMurray's death, there was a page missing. At the bottom of the preceding page was an account of a stroll through the gardens of the outpost.

"Suddenly," said the diary, "I stumbled upon——"

The next page had been torn out.

Another bit of information was pasted to a back page of the book. It was in no way concerned with other entries in the diary. It was written in longhand, as if Vanguard had intended some time to incorporate it in a paper on some scientific subject.

The paper read:

The curious thing about Bill Abbot is that he, like myself, seems effected by the disease I have called Uranus fever. From what I am able to determine, these sudden fits of dizziness do not effect any of the other Earthmen here, and, of course, none of the three aborigines. Major General Lancer tells me he has not been ill—speaking of disease caused by bacteria—since arriving on the planet. I have obtained secretly, however, a copy of his early reports, one of which complains of illness, and it is followed by a lapse of one week. The reports also list similar week-long illnesses in the case of my wife, the daughter of the commandant who died before Lancer was transferred from Saturn, and in the case of the ogre, Soapstone Davis.

In my case and Bill's case, however, the illness has been chronic for several Terrestrial months. All of the other cases dated from the arrival of Mott, Kinn and Duth, while ours dates from

our arrival here. In addition to the dizzy spells there are dreams of swirling mists, hideous, nightmarish visions of hideous wraithlike faces during our sleeping hours. Some of these are so real that it is only with difficulty that I can convince myself they are products of imagination.

The only satisfactory explanation is that the human systems rebel against the artificial environment of this accursed planet, so far removed and so different from the normal Terrestrial habitat. The saying, "One man's food is another man's poison," has been proved so often that I think it can be accepted as a good premise for this illness. Certain individuals can accustom their systems to dosages of deadly poisons. Others cannot. Shoot a man in one part of his body and he dies. Shoot another in the same place, under identical conditions, and he will live. I believe these dizzy spells which effect Bill and me are essentially the same disorder which troubled others here and which, for some reason, no one seems to wish to discuss.

AS DOUG finished reading the paper he noticed the light grow dimmer. Glancing overhead he saw a huge green cloud, similar to the cloud that had poised near the horizon the day he had landed with Kathryn on the space schooner from Mars.

In form it was similar to any cloud one sees on a threatening day on Earth. But there was a hard-to-explain quality, perhaps due to the green color, which gave the impression that it was *alive*.

It was appallingly menacing. Vaporous mists swirled against the glassy dome, seeming to exert great pressure upon the surface. The cloud seemed to thicken.

Then from the barracks near the laboratory rose a scream. It was a woman's voice crying out in frightful terror. It was Kathryn.

The scream was repeated. Then the woman ran from the place. Dressed in the slacks commonly worn by women on all occasions in the twenty-second century, her hair flying, she ran toward

the laboratory. In her hand she clutched what appeared to be a rubber ball, about as large as a tennis ball or baseball.

A second form emerged from the building, pursuing the woman. It was followed by another running figure, and then another. Even in the rapidly increasing darkness the identity of the pursuers was unmistakable. They were Mott, Kinn and Duth, the three Uranians whom Vanguard McMurray had considered harmless.

The woman ran toward the laboratory. Doug drew his flame pistol and moved forward to halt the creatures. But the distance was too far and the Uranians moved too rapidly. They seemed to bound over the ground with appalling swiftness. Mott, running in advance of his fellow creatures, reached forward to seize the woman. But as he did so a huge blur swooped from cover of one of the buildings and lurched into the path of the Uranian.

The creature sprawled. The figure that collided with it rose quickly and towered above the Uranian. An excited babble of strange words reached Doug's ears as the other two Uranians halted in front of the man who had frustrated the pursuit. The human voice jabbering to the three leathery creatures had a familiar ring. It was not Major General Lancer, nor was it the voice of Soapstone Davis.

From the dim recesses of Doug's memory came the answer. The voice was that of Vanguard McMurray—the man for whose murder Bill Abbot had been sentenced to death!

Kathryn flew into Doug's arms. She sobbed hysterically with fear, her face pale and her entire body trembling. Her right hand desperately clutched the rubber ball.

"T-take this!" she sobbed. "For love of the Sun, do not let them know you have it! That stuff is made of the flesh of Uranians! I'm sure it will un-

lock the key to the mystery of the planet. I found it in Bill's room, where he told me to look for it!"

Doug recognized the strange rubbery texture of the ball at once. It was pliable, like rubber, yet its feel was oddly warm, as if it gave off heat from some smoldering center. On the bottom the ball was rough. Turning the object over in his hand, Doug saw that it was covered with mud—good old mud from the river-bottom land of North America on the Earth. The soil that had been transported across two billion

miles of space to supply fertility to the gardens of the Uranian outpost.

Doug put the ball into his pocket, just as a figure appeared in the laboratory gateway ahead of them. It was Major General Lancer.

"I thought I heard a disturbance. I came to see."

The officer's voice was suave, oily.

"Those Uranian pets of yours chased Kathryn. Nearly scared her out of her wits!"

"Mott, Kinn and Duth? They would hurt no one. Perfectly harmless. Per-



"Greetings, fellows of Earth! The radio has informed me that you came here to see if I spoke the truth concerning the murder of Vanguard McMurray."

haps Miss Abbot picked up one of the toys and they wanted to play. They're just like children, you know."

"About as childlike as the innocence of Kubla Khan." Kathryn smiled, her courage restored. "No, general, I'm afraid you don't know your little boys. They're naughty. I really think they intended to tear me to pieces."

"Why? The general looked at the woman closely.

Kathryn looked up toward the roof of the city.

"Goodness, general, it's getting dark! What is the matter?"

"Just a storm. They occur sometimes. Never bother us, though, with our overhead protection. No man could live through one outside, however."

The whole structure of the glassy shell seemed to tremble with the weight of the clouds that pressed angrily from above.

DOUG did not mention to Kathryn nor to General Lancer his belief that he had heard Vanguard McMurray's voice haranguing with the three Uranian savages. He did not wish to arouse Kathryn's hopes with belief that her brother could be saved from execution by proof that the man for whose murder he had been condemned was not dead. As for the general, Doug was not sure if he could be trusted.

There had been proofs of McMurray's death. Even Bill Abbot did not deny, during his trial, that McMurray had been slain. Then there were photographs of the body, the inquiry conducted by television from Mars, after Bill himself had notified the interplanetary headquarters of the death. Some one had been killed, and the evidence that it was McMurray was irrefutable. Although battered, McMurray's head was not unrecognizable. It had been McMurray who was killed. Yet the figure that collided with Mott with such force as to knock the savage

to the ground, and which had talked in that un-Earthly babble to the three Uranians certainly was not a disembodied spirit.

The general talked for several minutes with Doug and Kathryn, leaving the impression that he was pumping them.

When General Lancer had left, Doug took Kathryn by the arm. "Come," he said, "I don't dare leave you alone and there is something I must learn."

He went into the laboratory. From a cabinet he selected a sharp scalpel and cut open the ball. From the center issued a pale-blue smoke.

"Tobacco!" they cried in chorus.

The center of the ball had been filled with tobacco smoke.

"Your brother did not smoke, but McMurray did. McMurray was the only man in the outpost who used tobacco."

Doug seemed to be thinking aloud. Then, half pulling the girl with him he left the laboratory. The two of them walked through the paved streets of the post, toward the outskirts, where the gardens lay.

The gardens were only vestigial. Only weeds and grass grew in the soil that had been transferred with so much expense from the Earth. There were not enough men to care for the gardens.

At the edge of the field was a large inclosure, housing several armored tanks and a small space ship, which had been used in bygone decades for short trips to Ariel, Umbriel, Titania and Oberon, the now uninhabited satellites of Uranus.

The outside storm was raging with greater fury each moment, as the two reached the field. The huge glass dome creaked with the weight of wind and clouds that hurled against it.

Kathryn clutched her escort's arm. "Doug," she whispered, "Doug! I—I'm afraid!"

"You *must* stay with me!" he insisted.

"You can't go back and the storm won't hurt you, unless that dome breaks, and it will take millions of tons of pressure to do that. There's something behind this that will rock the history of the solar system. McMurray stumbled onto it by accident, I believe, and it cost him his life. We are going to learn the truth and then, heaven help us!" Doug halted in his stride. His eyes fell upon a bare patch near the gate to the inclosure. "There is the answer to our puzzle!"

It was not a patch of ground one would notice ordinarily, except for three sunken pits in the center. Somehow that patch of ground reminded both Doug and Kathryn of a patch of graveyard.

THE ENTIRE PLANET seemed to rage at the discovery. The outpost shuddered beneath the whistling gale that held the dome in an enraged grasp. The place was nearly dark. The green clouds had blanked out the light of the distant Sun, save for a sodden emerald glow that filtered through the mist.

Doug handed his flame pistol to Kathryn. "Stop any one you see. If they don't stop shoot—and shoot to kill!" he ordered.

He brought a spade from the inclosure. He worked steadily at the first of the sunken places in the patch of ground. The soil was loose and, with little effort, he cleared away the dirt from the top of a coffinlike box. Without ceremony, he pried open the lid.

Inside the box, stiff as stone, was the body of General Lancer.

Kathryn gasped and grew pale as she saw Doug lift the body from the box and carry it to the space ship inside the inclosure. In a moment, Doug returned. Rapidly, he uncovered the second box. In it was Marg McMurray. After another half hour of toil, Soapstone Davis was carted from his box into the cruiser.

Doug had not finished. He examined

each of the boxes with care. At last he found what he was seeking, a black, pitchlike smear along the edge of one of the boxes. From his pocket Doug pulled out a package of cigarettes. He lighted one, puffed two or three times, then blew a cloud of smoke against the smear.

Kathryn could scarcely believe her eyes. The pitchlike substance seemed to detach itself from the box and roll around the cloud of smoke. Using his gloved hands, Doug molded the pitch-covered smoke into a ball and handed it to Kathryn.

"It's just like—like the ball I found in Bill's room," she stammered.

"It's a substance that is neither a gas nor a liquid," explained Doug. "It undoubtedly is formed by the intense Uranian cold in action with some chemical that is unknown on Earth. The presence of unknown or little-known chemicals on Uranus was suspected long before interplanetary travel, by examination of the absorption lines in the spectrum."

"But it's the stuff the bodies of the Uranians are made of," objected Kathryn.

"That's just it. The Uranians have no bodies! They're gas. That's why Mott, Kinn and Duth are the only three known to man. They're unique."

"Gaseous beings!"

"The idea is hundreds of years old," explained Doug. "As far back as 1919 it was discovered that the spectroscope had revealed evidence of the existence of chlorophyll on Uranus. Chlorophyll is a highly complex nitrogenous compound which supplies the green coloring matter in plants. Ordinarily it is not a gas, but different conditions, slight alteration of the elements in the compound might make a gas, not chlorophyll exactly, but something quite similar to it.

"Those green clouds pressing against the roof of this outpost are alive. They possess intelligence and emotions, and

even now they are venting the wrath of the gods on the superstructure, trying to get at us. Our discovery has been a dangerous one. The gaseous beings of Uranus have plans of conquest, perhaps, or it may be that they resent intrusion of mankind in their domain. At any rate these beings have plotted against the men of Earth, and unless we act quickly man's rule over the solar system is likely to be disrupted by gaseous life cells from Uranus."

"What of General Lancer, Mrs. McMurray and Davis? How did they get in those boxes?"

"They have been there for years, perhaps. There was a note in McMurray's diary which hinted that the gas creatures had overcome them, one by one, soon after Mott, Kinn and Duth arrived. We can assume that these three gas beings were covered with the pitch we found on the coffins and molded into anthropomorphic likenesses. By portraying sub-human intelligence and acting harmless they were admitted to the domed outpost.

"We have evidence that every one but McMurray and your brother were overcome by whatever weapons these creatures possess. McMurray and Abbot, however, possessed resistance to these weapons, just as you and I— You had dreams last night, no doubt?"

Kathryn nodded. "Horrible dreams—swirling clouds, hideous faces!"

"So did I and so did McMurray, until one day a dream came to life and batted him over the head!"

"A dream?"

"A Uranian. McMurray stumbled onto something in this garden patch one day. Perhaps he made the same discovery that we have just made: that General Lancer and the others we met at the outpost are merely gas creatures, clothed and painted to resemble humans, who have aped the voices and manners of the people they represent. We know

that McMurray must have molded the ball of tobacco smoke. Somehow your brother got possession of it. When the Uranians found out that their secret was out, they gave up trying to use subtlety and used violence in getting McMurray out of the road. Then, because Abbot was too watchful, or for other reasons, they pinned the crime on your brother so that he would be taken out of the way."

"But why did the Uranians assume shapes of the general and the others? Couldn't they have been just as well off in the forms such as Mott and the others?"

"I'll answer that, young lady!"

BEFORE THEM appeared two men. The one was in the likeness of General Lancer. The other was the likeness of a dead man, Vanguard McMurray.

Each held a flame pistol aimed and ready to fire. Doug's heart sank. These were not humans. He could not expect pity. They would kill with no more computation that a hunter kills a rabbit.

"Very interesting, your deductions." General Lancer smiled. "You have been right, except in one point—our motives. You attribute to us a desire for conquest or resentment of intrusion. Neither is right. We do not care whether one man or a thousand comes to our planet. Nor do we care to leave our home and invade other spheres of the solar system. We are contented here on Uranus. But one thing man has taught us. There are disadvantages in being a gas. Man, as an individual, has independence. He can travel on the ground, through the atmosphere and through space itself. We are limited to our atmosphere in our travels. Naturally, we saw the advantages of your form of life and adapted it.

"Our first experiments, Mott, Kinn and Duth, were not completely successful. All three are ungainly and awk-

ward. That is why we used men as dies to cast our body molds. The three you have carried from their sleeping place into the space ship have been satisfactory for models. You two will be more satisfactory, because you are young, more perfectly formed."

Doug's body tensed. He was separated from the two men by ten feet. If he could surprise them—

"I wouldn't if I were you," cautioned McMurray, seeming to read Doug's thoughts. "I would hate to kill you. Your body would not last for years of molding as the others have, if you are dead. I was made from McMurray's dead body. There are only a few of us. The body has turned to dust and there will be no more."

"Only a few?"

General Lancer laughed and nodded across the field. A column of men was marching toward them. Not only were the men dressed alike in soldier uniforms, but they were physically alike. There were companies of General Lancers. There were battalions of Soapstone Davises and even Marg McMurrays. Every detail, from the service stripes on General Lancer's arms to the frowziness of Marg McMurray's hair was exactly duplicated in each of the type.

"You'll never have a company of Doug Fishers," snarled the Earthman. "You'll have to kill me. I'm immune to that hypnotism or whatever it is you worked on the others."

"You are not immune to cold," leered the general. "In a few minutes my people from all parts of this planet will have crushed the dome above this outpost. You have no space clothing to protect you from the cold blasts that will strike you. You'll fall half frozen. We will inject preservatives into your blood stream and keep you in a state of living death for centuries to come."

"You'll never get away with it! My people—"

"Your people! Bah! A few paltry billions on a second-rate planet. All of your weapons of war could not kill my people fast enough to make an appreciable dent in our vital statistics."

A grinding crack sounded above. Across the domed roof of the Uranian outpost zigzagged a crack of destruction. The structure shook with renewed vigor as the gas beings outside realized that their efforts to break down the works of man was about to be rewarded. The superstructure seemed to bend inward.

A ROAR shook the ground around them. At first Doug believed it to be the dome collapsing. Then he saw General Lancer and McMurray vanish before his eyes. A streamer of flame flashed across the soil to wipe out the pantomimic human caricatures by the column.

Kathryn screamed and collapsed into Doug's arms. The Earthman picked up the burden and ran toward the huge thing that lumbered toward them. It was an army tank, spitting flame toward the horde of Uranians.

The door swung open and Doug ran into the machine, to be greeted by grinning General Lancer, the real major general of interplanetary fame, and a sweating soldier of fortune, Soapstone Davis.

"By Jupiter! That was a close shave." The general laughed. "Take her back to the space ship, Soapstone. Marg will have the motors working, if the sky doesn't fall before then."

The tank rolled back toward the ship. The survivors of the Uranian columns rallied on the field behind them. They had no weapons, but they charged. The field echoed with a weird, singing battle cry of the molded gas beings.

The tank plodded on, with Soapstone at the controls. General Lancer fired the flame guns. He cut down the

Uranians by the hundreds, but they did not stop. The molds for their bodies were fleeing; the future of the race was at stake.

The tank drew up besides the space ship. Already the combustion chamber of the old-fashioned rocket tubes glowed red as the engine panted in readiness for the first charge that would send it soaring into the planet's atmosphere.

Soapstone threw open the door. But he did not jump out on the ground. Some deathly fear of touching the soil held him back, until Marg McMurray, not the vixen, but a dimpled redhead, ran an insulated plank between the tank and the ship.

The transfer was made with but a minute to spare. As the door of the ship swung shut the dome of the outpost crashed. Glass showered like autumn leaves across the field.

It was then that the Uranian horde discovered the advantages of a gaseous body. Lancers, Davises and McMurrays were cut to ribbons by the falling glass. Screams of the injured sounded across the field.

"Let's get out of here!" cried Doug. Soapstone sprang to the controls, touched a lever. The passengers were thrown backward as sudden acceleration swept them off the ground.

The craft plunged into the misty, living gas. Even the sides of the space ship creaked with the weight of billions upon billions of gaseous beings pressing inward, trying to impede progress of the escaping Earthmen.

Davis and Doug Fisher manned the rocket feed lines. Fuel surged into the combustion chambers and sent the craft plowing forward against the immeasurable pressure of chlorophyll gas.

General Lancer, forward in the ship, sprayed ahead with his heat gun, driving the nebulous beings back out of the way. But as the gun broke down the

chemical compounds of the living gas, new clouds pressed in ahead.

But slowly the ship gained headway. Mile by mile it traveled upward. The gas clouds thinned, although even at twenty miles the progress was slow. Then, at last, the ship was free of the atmosphere. Like an uncaged bird, it sprang forward into the darkness of interplanetary space toward the distant twinkle of Saturn, nearly nine hundred million miles away.

"How on Earth did you come back to life?" asked Doug.

"You insulated us, young feller," said Soapstone. "You see, after we came to in the ship here, Marg started to go outside. The minute she touched the ground she keeled over again. The general got some rubber gloves and hauled her back inside. She came to. We figured that the ground was charged, and we couldn't understand how the rest of you were standing it. Then we gathered from your conversation that you needed help, so we started in. I didn't want any more fellers lookin' like me in the universe, and neither did Marg or the general. And say, while there's explaining to be done, how does it happen you weren't shocked into unconsciousness?"

Doug laughed. "It bothered me all along how the Uranians put some of you out and only disturbed the others. You see, different people have different resistances to electricity. The Uranians used just enough to shock you into unconsciousness. They were afraid to use heavier voltages for fear of killing you. After you were unconscious they supplied food and nourishment through periodic injections of life preservatives."

Kathryn moved toward the radio-phone. There was a message to be sent to Mars. A message that would save her brother's life when it was verified by Major General Lancer.

The Growing Consciousness

This title can have a triple meaning—and does. First of all, it refers to the Individual Consciousness; second, to the Composite Consciousness of the English-speaking world in regard to scientific conjecture; third, and specifically, it refers to the Growing Consciousness of scores of thousands of readers of Astounding Stories, who are becoming aware of the tremendous influence of science-fiction on a prosaic world.

The good workman never scorns his tools. He takes whatever leverage may come to hand, and pries the obstructing boulder from the path.

The pioneer does not let shallow water stop his progress down the river. He takes his canoe on his shoulders and breaks a trail through the forest until he faces deep water again. He does not stop because the travel is hard and slow, or because the burden is heavy, for his mind is fixed upon a goal, and he knows that somewhere ahead the river will be wide and deep.

So science progresses through a matted jungle of experiment—knowing that the clear, deep water of achievement lies at the end of the discouraging portage.

And to science-fiction is given the mission of encouragement. Looking ahead, through a tangle of test tubes, high tension wires, geological strata, and biological phenomena, we see a vision of mankind once more gliding smoothly on the cool, green waters of the river of achievement. His canoe is a space ship; his river is a rift in time; his power is the power of the atom. Luna has become his toy, and Jupiter his colony. He manipulates the secrets of the universe into strange revelations.

Do we go too fast and too far in our projections? I think not, for we are pointing the way to a distant goal. Do we mingle too much of love and adventure with these projections? I think not, for we do not emphasize them—but simply recognize their part in the human equation.

And always we are groping for a thing worthwhile, trying to hold a torch of encouragement for those whose lives are bent on extracting the secrets from test tubes and from distant nebulae.

It is not given to all the world to understand. Hence ours is an exclusive reading circle. Knowing that, I count on the loyal support of those who are able to appreciate—who have the faculty of understanding and are able to enjoy Astounding Stories.

We cannot expect every one to recognize or understand the impelling interest which grips us. But here and there we will find a kindred soul who has been starving for the very reading matter you and I take for granted.

For there is a Growing Consciousness throughout the English-speaking world—a slowly dawning recognition of science-fiction. And somewhere among your friends will be one or two—or perhaps three who will thank you heartily for introducing them to the reading circle of Astounding Stories. Will you try to discover them?

The Editor.

*A great
science novel*

FIRES OF

RAAH did not know that, but for the very peculiar circumstances of his birth, his name would have been Forster. But Raah had never heard of Chicago, where, twenty years ago, during the beginning of trouble, the Forsters had been famous.

He had never heard of men such as Einstein and Arrhenius. He had never seen the hell that was overwhelming the planet of his ancestors; in fact he had never seen Earth at all. And he had but a dim conception of the tragic heroism of his mother who had died soon after his birth.

She had come here to Wan in a space ship, in quest of something—she had not known what it was—that might help to check the inexorable progress of human extinction, which, by a strange paradox, had not begun its ghastly threat and promise with the forces of death, but with the very fires of genesis itself, anachronistically unleashed.

Always Raah had been here on Wan, a beautiful, wild, verdant, tremendously deep valley of an otherwise almost dead world. In a primitive environment he had grown to young manhood; he had learned to speak, in so far as his human vocal organs were able, the soft, liquid tongue of the furry elves of Wan.

His life, in spite of hardship, had not been unhappy. There was danger, of course, and fear. The Tegati were the bogies of his existence.

During the protracted day they slept somewhere high up in the tremendous mountain barriers that ringed Wan. They were alive; they were horrible, they were tenuous almost as ghosts, with their thin, bubblelike bodies, and the clawed tendrils that dangled around their fanged mouths.

At dusk they came down into the

valley to feed. And woe betide any hapless creature, not provided with a hard shell, who chanced to be away from the refuge of its lair at that time!

Then, too, there was the constant threat of quake and volcanic eruption. Wan was fifty miles below the level of its surrounding inner barrier, and it penetrated close to the internal fires which still glowed faintly and dangerously in the heart of this small husk of a world. Ikaah, the black lake at the center of the valley, had once been an active volcano. In fact, carbon dioxide, bubbling from its depths, must have been the source of Wan's rich oxygen, which was freed from the compound by the action of the chlorophyl in green plants.

But in spite of these dangers and worries, there had been much to hold the attention of a growing boy. Old Treb, who on Earth might have been called a wizard or a magician, could tell tales of things incredible. Then, too, he was Raah's foster parent, replacing, since the boy's infancy, the mother whom he could not remember. Thus Treb held, for Raah, a position of authority and respect.

There had been a time not so long ago, Treb had said, when many meteors had fallen. Soon afterward the Sun had arisen one dawn, its face tinged with a faint, glowing green. Before it was halfway toward its zenith this green veil had faded. But unfamiliar cancerous diseases had come to plants and animals alike, and an odd, corrosive scum had appeared on the surface of Ikaah. The diseases had now died out, but the scum still lingered.

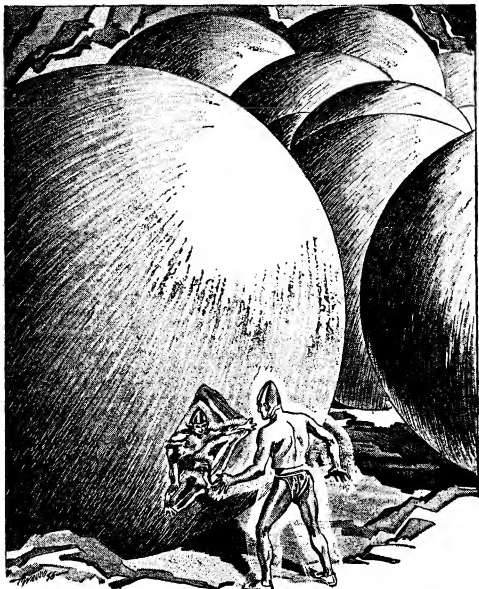
Then, a while later, a huge, gleaming thing that spat flame had appeared over the eastern mountains. It had paused in its flight; it had wavered; and then,

GENESIS

*And so the Tegati—
creatures of the Moon—
come to Earth—*

by

RAYMOND Z. GALLUN



Instantly, dense air puffed from its interior; but the tough, gummy texture of the balloonlike dome of translucent vegetable matter was sufficiently rigid to prevent its collapse.

with a roar, it had plunged straight into the waters of Ikaah. But before it had fallen it had disgorged a being who had floated to the ground, supported by a bulging contraption of white fabric. She had been like Raah, only more fragile.

She had lived on Wan for some time, cared for by old Treb. She had spoken little, and in an unknown language; but there had frequently been, in her eyes, a look of horror eloquent of some cosmic catastrophe beyond the grasp of any Wanite.

Yet a number of Wan's long day-and-night periods, totaling in duration a terrestrial year, after her son was born, she had died; and her grim secret had perished with her. Treb had never been able to learn her language, and she had done but little better with the speech of the furry elves.

This much Raah knew of his mother and of his origin. The result was an intense natural yearning to know more, which had grown upon him gradually during his adolescence.

ONCE the ancestors of the elves of Wan had been slaves, serving a people of godlike learning. The latter had dwelt in magnificent cities, not far beyond the inner barriers of Wan.

But in spite of their control over natural forces, the godlike ones had suddenly disappeared. Whether, moved by a hidden motive, they had committed universal suicide, or whether their science had enabled their intellects to discard the limitations imposed by tangible and mortal bodies, was unknown.

Bereft of masters now, the furry elves had journeyed down through mountain gorges into warm and fertile Wan, bringing much marvelous equipment and loot with them. The transport system had still been functioning, and so the migration had been easy.

But those tiny slaves were simple creatures. What knowledge they had,

had swiftly decayed; and they had reverted to semisavagery, living in crude stone huts, tilling little patches of ground during the long day periods, and hibernating during the night.

Only Treb's direct family line—his father, his grandfather, his great-grandfather, and so on back—had made any attempt to preserve the ancient sciences. Invoking the magic of those sciences, Treb had scaled the mountain walls of Wan during his youth and had visited the region of dead glories.

The experiences of this venture had provided him with many wonderful tales to tell his foster child, who was almost his only friend and associate, for his own people were suspicious of his great learning.

While he and his pupil cultivated their garden patch, while they roamed the bizarre forest, searching for fruits and useful herbs, while they toiled over strange experiments in the wizard's workshop, and while at sunset and dawn they viewed the grotesque grandeur of the valley that was their home, Treb had talked of the things he had done and of the mystic miracles he had seen.

The effect was an inevitable one. Raah was only a half-naked savage under the passive spell of primitive Wan; but even during his early childhood we can imagine him lisping in the soft speech of the furry elves: "Some day we shall climb up there beyond the barriers. Some day we shall descend to the bottom of Ikaah, won't we?"

The wizard's great, catlike eyes would shine with enthusiasm and he would reply: "Yes, child of the unknown. When you are adult, we shall do those things, if to do them is stamped in the fixed course of the future. I am too old to act alone."

II.

TWENTY YEARS after the beginning of the catastrophe that had brought Amy Forster to this mysterious vale,

which was a deep hole, five hundred miles wide, in the center of a much larger valley that scarred almost half a world, master and disciple began to make definite plans.

And a sudden, severe quaking of the ground forced the issue. The time was near to sunset. Raah had wandered off into the prickly forest of cactiform trees. For hours he had lain sprawled in the mosslike grass, looking up dreamily through the warm, insect-flecked haze, toward the jagged peaks of the western barrier that loomed clear and harsh in the partial vacuum that enveloped it.

The first temblor passed quickly. The tortured, subterranean groaning that accompanied the shock died out. By then Raah was bounding down the forest trail toward Treb's lair.

Through rifts in the jungle, he glimpsed Ikaah, its surface looking black and awesome now, like the stare of a devil. The lake was set between high cliffs of black, fire-formed basalt, which reflected specks of sunshine. Yet the water was lusterless and turbid now.

Volcanic vapors were boiling up angrily through it, and above the lake hung a sulphurous, yellow pall. Soon, perhaps, Ikaah would be changed back into the volcano it had once been.

The wizard's workshop, built of roughly masoned stone, was located on a low, rocky knoll, isolated by several miles from any Wanite village.

His lithe, athletic young body glistening with the sweat of exertion, Raah approached the structure. He hammered on the massive copper door. Its stout bolts grated, and he was admitted into the cool, dusky interior. The door was reclosed and bolted in his wake.

From close beside him came a series of musical twitters, too soft and beautiful ever to be reproduced accurately by human vocal organs. To any other Earthman they would have been mean-

ingless, but to Raah's practiced mind they formed the words and sentences of coherent speech.

It was Treb who spoke. "I was waiting for you, youth of another world," he said. "I knew that you would come. The shaking ground told you that we must hurry. Though we face grave danger in our dive into Ikaah, we cannot delay it longer. The lake bubbles as I have never known it to bubble before. If we delay too much, the things we seek at its bottom may be destroyed. Dusk and the Tegati will come soon. We must wait until then, for now my people are away from their lairs; they would kill us if we dared to approach Ikaah, whose fire devils they fear we have aroused with our magic."

Treb was scarcely three feet tall. The fine, gray fur that covered his body was silvered at the tips; but his age, indicated thus, detracted nothing from his feline alertness. Dynamic energy snapped in each darting glance of his glowing, catlike eyes. But in those orbs, too, there was an indefinable something that was a reflection of the stuff of dreams.

Raah nodded slowly, uttered a few words, coarse and grating to Wanite ears, but understandable. In him were the tensions, fears and fascinations of approaching adventure.

Together Raah and his teacher moved about the cavernous chamber, gathering the things they needed. Any Earthman, suddenly transported to Treb's lair, would have found his surroundings a quaint and mystic miracle. In it, the crude barbarisms of tools and devices, hammered roughly from copper, mingled incongruously with mechanical refinements which could not be realized on Earth in less than a thousand years.

Arranged on shelves, woven from the stems of grotesque plants, were various glittering pieces of apparatus, belonging to another era. All that was here in the

workshop represented the attempt of a keen mind to cling to the wisdom of a past that was dead.

Treb and Raah donned small conical caps which some forefather of the wizard had brought down from the heights above Wan. Each of the adventurers provided himself with a stout copper bar and a coil of fibrous rope. Twice, while they waited, sharp temblors rocked the ground.

Dusk came at last, soft, soothing and purple, mellow with a warm and shadowy stillness, yet heavy with grim portent. After several minutes there was a rustle, like the sound of a breeze in the forest. But it was not caused by a breeze.

Delicate leaves were withdrawing, like animate things, into hard sheaths that would protect them from the hungry maws of the Tegati, that presently would be swarming down in incalculable hordes from above the barrier, and from the coming cold. Even warm Wan, unexposed to the Sun's rays during a night two weeks in length, could become a blizzard-racked hell.

Other plants, whose environmental adaptation had not provided them with means to protect themselves, but had given them the faculty of swift and fecund growth, waited stolidly motionless for the end, which only their myriad spores could cancel at the coming of dawn.

And the furry elves retired to the shelter of their dwellings. Not even their fear of blasting death from Ikaah could smother their terror of the ghastly Tegati. The latter loved a moving, animate quarry best; thus they always swarmed thickest about the Wanite villages.

SO when two grotesque figures emerged from their workshop, they looked out upon a deserted valley. Far up toward the west, where bright stars were beginning to burn, a ruby streak

of sunset still lingered. Against it were thousands of black specks, wavering and hurtling nearer. The whisper of their flight was already audible.

Raah and Treb had acquired a limited immunity from attack by the weird monsters. They wore no material armor, but an auræ of soft, amber flame streamed from the conical caps on their heads and enveloped their entire bodies, protecting even the soles of their bare feet with a thin film of insulating energy.

The flame, invented in a dimly remembered age, had several functions. Within limits, its tough, substanceless texture could resist violence delivered by sharp weapons such as the fangs of the Tegati. It also could maintain normal atmospheric pressure within its shell; for, in effect, the auræ were like any tough, air-tight garment, such as a diving suit.

Moreover, the air contained in the purposely enlarged cephalic portions of the flame mantles was constantly kept pure by the action of the energy, the carbon dioxide exhaled by the wearers of the caps being split up, the oxygen being freed for rebreathing, and the pure carbon being expelled in the form of microscopic diamond granules, through the texture of the mantles.

Their movements completely unhindered by the auræ, Raah and Treb made their way down to the rocky shores of Ikaah. Here they paused at the brink of an abrupt hundred-yard drop to the seething surface of the water beneath.

While acrid vapors coiled around them, they fastened long copper bars to their waists with part of the rope they carried. The bars would act as weights while the adventurers were making their dive to the bottom of the lake; and they might prove useful as tools during the submarine exploration.

Raah, forgetting the peculiar properties of the auræ, attempted to loop the

rope, which he had tied to his bar, around the belt of his breech cloth, only to discover that this was impossible. His flame mantle resisted the effort just as any other stout, flexible garment, put on over his belt, would have done. He chuckled sheepishly, and, aping Treb, tied the ends of the rope around his waist, over his aura.

The ancient, metal sphere, which was their most important piece of equipment, was, except for a boss of black mineral set in its surface, perfectly smooth and shiny. There were no hooks or projections to which one might cling, or to which anything might be fastened in an ordinary manner.

When Treb's tiny tentacular fingers turned the boss a trifle, there was an interesting effect: The sphere floated in the air without visible support. Raah felt a gentle tug, as if he were a bit of steel attracted to a magnet. His hands were drawn back into contact with the silvery globe. A gentle surge of power was now active in its mechanism and could be increased when necessary.

Wanite and Earthman peered from the clifftop at the churning surface of Ikaah far below. The frothy, steaming water was almost boiling-hot. Floating masses of scum bobbed and danced here and there, like the foam in a bubbling caldron. Poisonous vapors writhed lazily up the face of the cliff.

But there was a mounting whisper that mingled with the seething voice of the lake. The adventurers glanced over their shoulders. The air behind them swarmed with balloonlike monstrosities that, with odd, jerking, pulsating movements, approached nearer. From them, like trailing, tattery streamers, dangled slender tendrils, covered throughout all their length with sharp, curved claws. These aërial devils were the Tegati.

The most prominent organ of a Tegati's body was a large bladder of parchmentlike skin, the latter roughened by many dead-air cells, as a protection

against cold. The vital organs were grouped close around the fanged mouth orifice, from the lips of which trailed the creature's poisonous tendrils. Breathing was one of the functions of the bladder; but it also served as the mechanism of flight.

By spasmodic contraction it could eject through the mouth of the creature puffs of air which served not only to propel the light-weight body somewhat after the fashion of a rocket, but could sustain its altitude against the weak force of gravity. Blood, rich in hæmoglobin—the oxygen-collecting pigment in red corpuscles—veined the thin, translucent texture of the bladder. To the Tegati, this blood development was necessary, for they lived much of their lives in an extremely rarefied atmosphere.

Treb and Raah looked at the swarming, voracious hordes of them, and then back at malevolent Ikaah. Any fear they may have felt at the prospect of descending into the latter suddenly seemed trivial in the face of a greater, more repugnant evil.

Treb turned the boss on the metal globe a trifle farther, feeding its mechanism more energy. At once the bodies of both himself and his companion were pulled firmly against its shiny surface, and with it, floated free of the ground.

A sucking down draft of cool air, drawn toward the hot waters of the lake, wafted them from the clifftop. Gently they began to settle, at the same time moving forward above Ikaah.

The Tegati caught up with them. They felt, through their flame mantles, the vigorous jabs of sharp, poisonous fangs and claws; and, cold with revulsion, they struck back.

III.

AT LAST Earthman and Wanite alighted in the water. Still held firmly to the metal sphere, along with dozens of Tegati which the attraction of the

device had captured, they began to skip over the surface of the churning lake by kicking at the water with their feet. Their weight, under the influence of the silvery ball, was still almost nothing.

Presently they reached a place close to the shore of an island, whose jagged pinnacles reared, black and awesome through the dusk and murk, like some lost soul in hell groping for the stars. The water here was coated with thick slime.

Tegati, braving the acrid vapors with devilish persistence, were trying to reach and devour the slime, but the choking gases forced most of them back.

"Here we go down," said Treb, his musical voice muffled by his aura.

He readjusted the boss on the sphere, shut off the power. Relieved of the mechanism's buoying force, and dragged by the density of the copper bars tied to their waists, the two adventurers sank at once into Ikaah, and the globe sank with them.

Their flame mantles continued to function normally in the new medium, protecting them from heat and supplying them with fresh air to breathe.

Minutes passed. They could feel pressure building up around them, though this process was not nearly as rapid as it would have been under similar conditions on Earth, and their flame mantles fought back its force to a certain extent.

Buffeted by boiling currents, enveloped by thick darkness, the adventurers continued to sink. And at last they settled deep into mucky ooze that trembled with sharp seismic vibrations.

They groped around for the sphere, which had slipped from their grasp during the descent. Finding it, each fastened an end of the remaining rope to a rocky projection near by.

Each grasped the other end of his rope, and began to circle in the thick darkness, seeking the unknown thing which must lie submerged here.

Presently Raah's groping fingers came in contact with a curved surface. Tactile exploration of it revealed the riveted frame of what was obviously a small circular window. This was the corroded hull of the space ship they were looking for!

He cried out to his Wanite companion: "Recoo! Treb! Come quickly! Here is what we seek!" The excited sound of his words penetrated his flame mantle and was transmitted easily by the surrounding water, in spite of the grinding rattle of seismic shocks.

From a little distance came the wizard's reply, sounding eerie and slurred in the strange medium: "I come! I come!"

A few moments later Treb and Raah began to creep slowly around the slim thing. It was long and beautifully tapered. One end was finned. Great, tubular vents, like the flaring nostrils of a demon, were set between the fins. The other end was crumpled and embedded in Ikaah's bottom.

The dim glow of the flame mantles was of almost no use to them in making their inspection in the murky, turbid water; but they still had their senses of touch.

Now they clambered to the curved back of the thing. Here there was a long hump, fitted into a groove. They soon found that the hump was not properly a part of the greater metal fabrication; for it was fastened into the groove with stout bands, the ends of which were joined by means of what a native Earthman would have thought of as complicated buckles. The hump was a tapered cylinder with a finned tail, like its parent enigma.

The adventurers, attracted by more intriguing mysteries, sought means of entrance to the larger vehicle. Presently, they found in its flank what seemed to be a door.

Clumsy with eagerness, they tugged and twisted at the T-shaped handle pro-

jecting from the edge of the door. At first it refused to yield to their efforts, for corrosion must have welded the metal a little. Then Raah untied the copper bar from his waist, and, using it as a hammer, tapped lightly on one arm of the door handle. The latter turned on its pivot, and rusty bolts responded to the movement. Treb's tiny hands tugged at the handle. The portal opened.

There was a gurgle of bubbles, and a momentary suction, as water rushed into the small, closetlike compartment which had been sealed behind the door.

Now the Wanite and the Earthman clambered into the compartment. Again their way was blocked by a second portal, identical to the first. Raah groped for the handle that worked its lock, but the wizard checked his intended act with a warning hand.

"Not yet," he said. "Whatever lies beyond this valve may be injured if the flood of Ikaah is allowed to enter. We must close the outer portal first."

THE ELF of Wan pulled the external door to, sealing himself and his friend in what might easily become their tomb if the bolts chanced to jam. Almost coincident with his act, a particularly violent temblor of the lake bottom caused the stout metal around them to groan and crackle.

Tensely he and Raah waited for the vibration to end, not knowing whether, in the next second, they would be alive or dead.

Raah found the inner valve of the air lock easy to open, for there was no corrosion here. As the hinged mass of metal folded inward, there was a gurgling, rushing sound, and the water in the compartment—approximately two cubic meters of it—flowed from around them. They were standing free, in air.

Automatically they advanced into the black hole before them. The amber glow of their flame mantles relieved the

dense gloom to some slight extent—enough to reveal curved, untarnished walls and banked instruments.

At first Raah was dumb with awe, knowing that all these strange miracles around him might have told tales of fear, courage, love and devotion on another planet—a planet which was his real home.

But soon he grew more accustomed to his surroundings. He chuckled and clucked as any pleased savage might have done in the presence of civilized novelty. Now he began to wander about, touching and fingering this and that.

Thus, inevitably, he found a light switch, pressed it. At once the compartment was flooded with hard, white radiance, as rarefied gases in quartz bulbs, responded to an electrical stimulus. To the young Earthman who had never seen Earth, this was like a major accomplishment of the gods. He gasped raggedly, but, recovering himself, he gave a nervous laugh.

Treb's wider experience, with even greater marvels, made him less responsive, though there was no doubt that he was intensely intrigued, too. He advanced to a little black box, surmounted by a screen of ground quartz. Experimentally, he twisted dials and snapped switches. Presently a glow of activity awoke in the vitals of the apparatus. A dim, electrical crackle followed. Then a voice spoke, an Earthly voice, uttering words beyond the comprehension of these two from Wan.

Raah wheeled about, stood staring at the box. Treb remained impassively near. Neither understood anything that the voice from the radio said, but they listened anyway, bound by a spell of fascination, and sensing in the tone of the words an indefinable suggestion of tragedy and defiance.

"TO lose hope would mean the end, without question," said the voice. "We

must not do that. We must always believe in our powers. Perhaps some whim of chance will favor us. Till a thing is finally accomplished, we cannot be certain of its outcome. I have the means to assure our survival, if only there were sufficient time to develop it. Three months is all I ask. Many say that the remaining refugees cannot stand longer than a few weeks. But they must! You of the Pittsburgh refuge and of the Los Angeles refuge must fight with all you have, as we of Kansas City are fighting. The destiny of mankind is in our hands, for there are no other strongholds left.

"But now, back to our subject: What, in general, is life? Few things are more difficult to define. Though protoplasm is the basis of all known organisms, life is not protoplasm, but a process which goes on within protoplasm. It is a complex phenomenon of motion and of change, involving complicated compounds of hydrogen, oxygen, nitrogen, and carbon, though, unknown to us on distant worlds, it might possibly involve the compounds of other elements.

"It is capable of feeling and responding to sensation, and it can propagate. It has the will or desire to continue to exist, and in its higher forms it possesses consciousness and intelligence. In many respects it is the strangest, most unfathomable miracle of the universe.

"Never yet, in spite of extensive study, has the nature of its driving forces been quite understood. Not so long ago it was actually considered a supernatural phenomenon.

"Science has long known that the normal, complex organisms of the Earth were developed through a process of evolution. But how, in the beginning, did the first one-celled amœbas and bacteria, which supplied the raw material for evolution, arrive here?

"Arrhenius conceived brilliantly when he advanced the theory that the

normal fauna and flora of Earth may be descended from minute spores propelled here from other inhabited planets by light pressure and by the negative electrical repulsion of stars. The latter force is the reason why comet's tails, composed of tenuous gases, are always directed away from the Sun, which, of course, is much like any of the other stars.

"But brilliant though Arrhenius' idea was, it evaded an issue; it explained the origin of organisms on Earth, but it failed to explain the real birth of life itself—the misty transformation of inanimate elements into the moving, changing substances of animate tissue. Where, in the great cosmic plan, lies the hidden spark of genesis?

"We have been through much in recent years. But in spite of our rapid reduction in numbers and resources, we have learned much. We were misled at first. We thought the diseases, which we have now controlled, and the slime which promises our extinction, came to Earth in the form of spores, either in the manner that Arrhenius outlined, or, more probably, in pits and crevices in the many meteors that fell.

"But I feel sure now that the whole spore theory is incorrect. It would be impossible, of course, for us to detect the arrival of isolated spores into our atmosphere; but in the case of the meteors at least, repeated culture tests and microscopic examinations have failed to provide us with the slightest evidence that they are anything but sterile.

"No, I am sure that we have seen a greater wonder than we have ever more than dreamed of. I have checked the evidence and now, after all these years, I think I have a glimmering of the truth!

"New, alien life was actually created here on Earth, just as at the beginning of this planet's biological history! By a combination of natural circumstances

somewhat out of the ordinary, anachronistic forces were set in motion. They were of the same character as the original forces of creation, but probably of greater intensity, and of much lesser duration. But while they lasted they did their diabolical work well, producing forms of life far too young to be highly organized, but possessing the vitality and the fecundity to crowd out all lesser organisms, and to promise death even to mankind.

"I am sure that I know something of the nature of those forces, and of the causes of their release. I am sure——"

IV.

SO the sonorous tones continued, probing a detail in the vast plan of the universe. Yet the ideas expressed remained hidden to the two listeners on the bottom of Ikaah. Of English they knew nothing; but catastrophe, masked yet terrible, they could sense, and mystery still could intrigue them; so they faced possible death here in a metal coffin on the floor of the volcano lake, to listen. And the voice droned on, while the two listened to sounds they could not understand.

Raah toyed with a small silver mirror which he had picked up from the wet plating under his feet. The article, he could guess, had belonged to the dim, beautiful, legendary entity—his mother. Treb, his first surprise gone, began absently to fumble again with the controls of the radio. Thus, after a moment, the television plate went into action.

As if by some enchantment, the gaunt, austere visage of the speaker appeared on the screen of ground quartz. His lips moved with his words, his gray, leonine head nodded in defiance and emphasis. There was bitterness in the angle of his jaw, but there was courage and determination there, too. The two from Wan looked at his image in mute surprise. Though they could not have

known it, he was John Maynard, friend of Raah's long-dead father.

Around him was his laboratory; bright metal and glass had been fabricated there into devices which enabled him better to understand nature and to control it a little.

Without that control this savant of Earth would have long since ceased to be. That was obvious to the two observers who watched and heard what was evidently intended for other ears and eyes than theirs.

There were massive, steel-ridged windows in the walls of the terrestrial laboratory. Visible beyond them was a yellowish twilight, like faint sunshine seeping through a curtain of miasmic fog. Hills could be seen, marked with the gaunt stumps of dead trees that thrust their broken tops through a morass of green slime which throbbed and pulsed with a restless and malevolent animation.

The slime was everywhere, and it was alive. Other life had succumbed to its noxious onslaught. The girders of buildings, grotesquely twisted like nightmare fingers against the drab sky, were wrapped in quivering shreds of the stuff. Acids produced by it had corroded them, eating away their substances, until nothing but a fragile relic remained of their former strength.

And the fate of this refuge, of which the laboratory was a small part, seemed destined to be the same. Its lower walls, braced by gigantic concrete buttresses, were covered with the slime. The smallest chink and cranny were being spread by invading pseudopods of this fiendish protoplasm. Slowly the structure was being weakened, the very ground beneath its foundations being softened by seeping acids.

Reinforcing metal was crumbling away. Strained by sagging foundations, the walls seemed inevitably doomed to fall. If they did, the slime would ooze swiftly into the refuge, and though its

inhabitants might not perish violently, the machines which made their continued existence possible would soon afterward be acid-eaten and useless, and their masters would die of starvation.

Many men, clad in grotesque, bulging attire, were out there beyond the walls, battling the slime with small flame throwers and seeking to make repairs of the damage done; but their fight against the brainless, viscous flood which knew no fear, was like trying to dam a river with one's bare hands.

In the sky several planes moved back and forth steadily, spraying thin clouds of poison, which might have been more effective in protecting the refuge, except for the frugality with which the chemical was used. Evidently the supply was low and tottering resources could not even meet the demands of necessity.

The speaker continued with his odd jargon, rasping to ears accustomed to the soft language and more highly developed vocal organs of Wan. Raah and Treb kept their gazes riveted on the television screen.

For many minutes there was no one in the laboratory chamber but the gray scientist. Then a door opened, and the click of footsteps announced the arrival of another person. Presently she was beside the old man.

Sight of her, to Raah, was almost as great a surprise as the first words which had issued from the radio. Never before had he seen an Earthgirl; so her pert, blond presence worked a subtle and startling magic, such as few of his kind have ever quite felt, on the young Earthman.

She spoke, and he who was accustomed to the beauties of Wan's speech, still thought her voice as beautiful as her face and figure. Her words were controlled and poised, but in her amber eyes there was a grief that could not be mistaken.

"Roland has just come back, father,"

she said. "The Pittsburgh refuge has fallen. They are trying to bring the survivors in, but there are so few planes left, and so little food. How much longer can we hold out, father?"

John Maynard's lips trembled with emotion, whose weight Treb and Raah could perceive. They listened to feel the intensity of his reply even though they could not understand his words. But destiny canceled their expectations, and grim facts which directly concerned themselves took the upper hand.

THE FLOOR beneath them rattled with a jarring shock. The fiery forces under Ikaah were at last really breaking loose. The first jolt of the quake was followed by twenty seconds of swaying, tooth-cracking vibration. All around them they heard the growl of churning water, fighting the heat of molten lava. The view in the television screen trembled and fluttered. The lights in the submerged space craft winked out, then burned again briefly, before lapsing forever into darkness.

The quartz screen of Earthly visions was now eternally dark, too, and there was no sound in the black box of the radio apparatus. Perhaps strain of the ship's weakened hull had snapped some power cable. Anyway, marvelous equipment that had remained intact and in working order after long years of disuse, had at last lost its capacity to function.

"They are my people," Raah shouted above the groan of tortured metal. "They are in danger. I want to go to them, Treb. Why can't I? Why must it be impossible? Or is it?"

He gazed around the trembling, gloomy compartment with new vision. His attention centered on a great black lever, dimly visible in the glow of his flame mantle. The lever was the most conspicuous of all the controls here.

"Maybe I can go to them!" he shouted. "This monstrous thing came



"Tegati!" he yelled. For that was what they were, beyond question. But how had they come to Earth?

across the emptiness to Wan. Why can't it return, whence it set out, taking me with it?"

Save impulse sent him, in one lithe bound, to the housing from which the lever projected. His fingers closed on the massive grip. Without thought of consequences, he jerked it back. In the flooded rocket tubes there must still have been a residual trace of fuel; for from somewhere astern there came the crashing thud of a heavy explosion.

Half dazed, Raah and his companion were both hurled prostrate. There was a moment of conspicuous silence, followed by the gurgle of entering water. A seam had opened somewhere in the rusted, crumpled hull. It had withstood much abuse in the past, but now the limit of its endurance had been reached. Soon the entire ship would be flooded.

Then Treb toppled his way to the Earthman's side. "We are not yet defeated," he said. "There is the little craft resting in the groove on the back of its parent. It is intact, and doubtless your mother brought it with her for a purpose. The sphere of the ancients will enable us to lift it out of Ikaah. Who knows that we shall not be able to carry it to a point from which it can be hurled to the world of your parents?"

"Then we shall try!" Raah stated fiercely.

Treb opened the inner valve of the air lock. A moment later he and his companion were out in the seething chaos of Ikaah. There was a sort of illumination now. The murky water looked like a flickering, red-lighted fog. Somewhere, the bottom of the lake had split open, and white-hot lava was oozing up from the depths of the world of Wan. The swirling, battling water could not cool it at once, and so there was light.

With their copper bars, the adventurers contrived to pry the metal straps loose from the little space craft, nestled

into the streamlining of the larger ship. The ancient hoisting globe, in the excitement of discovery, they had left carelessly on the lake bed; but they located it now without special trouble.

Raah, staggering in the uncertain currents of the hot flood around him, carried it to the sunken vessel and held it against the curved top of the little craft. Treb manipulated the boss of the globe cautiously, to achieve the desired result. Too much energy must not be used, else this hoisting device of the ancients, influencing all surrounding substance, would try not only to lift the small rocket but the larger one as well, and that would mean——

At last the lesser craft broke free from its mountings. With Raah and Treb on its back, held close to the sphere, it began a swift rise through Ikaah. The water, being a much better conductor of sound than air, now throbbled with ear-splitting vibrations.

Then the rocket, still supported by the globe, was floating upward through the air. About it swarmed and bobbed myriad hosts of Tegati, whose senseless determination seemed to fear nothing—not even the red glow that burned in the depths of Ikaah, or the hot chunks of volcanic material which shot upward like a geyser of flame from one spot in its turbulent surface. Only the reek of poisonous vapor could keep them from approaching too close to the hell of tortured fire and water.

Beyond the crumbling, shaking cliffs that surrounded the lake, nature seemed deceptively peaceful by contrast. The dusk had deepened a little, but not much, for the world to which Wan belonged rotated very slowly. The stars were bright and motionless.

In the shadows, it was not easy to see the valley floor buckling and crumbling. But shrill, birdlike screams could be heard above the tumult of Ikaah. They were the screams of fear and death. Treb's people had been driven out of

their lairs by the quake, to meet more horrible ends under the fangs and claws of the Tegati.

V.

THE SPACE BOAT floated perhaps two hundred yards above the lake now. Treb, crouching on its hull, looked about. Pity for his strange, decadent fellows was in his eyes; but he could do nothing for them.

Slowly, pulled by the hoisting sphere, the rocket gained another hundred yards of altitude. Tegati circled and bobbed around it, their thin bubblelike bodies pulsing, their tendrils lashing, their beady eyes, almost hidden in fleshy folds close to their mouths, agleam with brainless malice.

Treb and Raah struck out at the encumbering masses of them with flailing arms, as before; yet, for the moment, the adventurers felt less revulsion for the things, and accepted their attack more stoically. Perhaps the destruction and death going on in the world below had temporarily dulled their emotions.

A tiny breeze was blowing them toward the west. But it was only an atmospheric eddy caused by the heat from Ikaah; and even if it were active over a large area, its speed was so low that it could not carry them far.

Treb knew that the energy supply of the supporting globe was limited. If the power ran down, they would settle into Wan to die with its other inhabitants.

"There is only one way for us to attempt escape, Raah," said the wizard. "It might be successful, and it might not."

He moved gingerly over the curved back of the rocket, presently locating a double hatch which operated like the air lock of the larger ship. He crept through it, beckoning Raah to follow.

The latter closed the hatch behind him, to keep the Tegati from entering.

The controls of the craft differed in no important respect from those of its parent rocket. Treb, lying prone in the low cylindrical compartment, pulled the throttle lever a trifle. For half a minute there was no result. In fact, there seemed small reason to hope for any result, considering how long this fantastic machine from across space had lain submerged.

But hard, costly alloys had resisted corrosion very well; besides, the fuel tanks of the little ship, unlike those of the ether shell that had brought it here, were full.

And so, when the heat of an electric spark had dried hidden ignition points, normal action came. There was a ponderous, soughing roar accompanied by a powerful forward thrust.

Treb's small, furry visage registered a grotesque travesty of a grin. He had not known how this terrestrial fabrication was meant to propel itself; he had had only Raah's experience with the lever aboard the larger ship to prompt him to move this other lever. Yet the effect, as far as he could see, was satisfactory.

The space flier, still supported by the hoisting sphere, and driven now by blasting streamers of flame from the vents at its stern, shot steeply westward through swarms of Tegati, toward the nearer ramparts of Wan. It was pointed in a good direction, and its natural stability kept it on a straight course; hence there was no need to steer.

Its tiny airfoils, no doubt, provided a lift which, had it been guided by a skilled pilot, would have been adequate alone to maintain its flight. But Treb was not a skilled pilot; he was only a daring experimenter who, so far, had been lucky.

Using his judgment as best he could, he kept the rocket's mechanism active

for several minutes. The sensations he experienced were quite as thrilling as any he had ever known; so he did not pull the throttle any farther, though there was plenty of room to do so.

As matters were, the craft soon attained a speed rivaling that of a bullet. Finally, because of the danger of collision with the mountain barrier, and because energy must always be conserved, the wizard shut off the driving blasts. The flier glided on steadily. In the thin air of the altitude that had been attained, there was only a gradual loss of velocity through friction.

Raah, who had gone through this latest piece of adventure without a word of comment, continued to crouch stonily beside a small, round window, absorbed with his own thoughts.

Wan passed beneath, a blurred hole filled with elusive, gloomy shapes, that flickered in the waxing red light from Ikaah. At last the mighty western barrier loomed close ahead. Some seconds later the rocket, its velocity now much reduced, bumped heavily against stone.

Raah clambered through the hatch; Treb went closely after him. They fastened rope about their middles, tethering themselves to ring bolts in the space boat's flanks. Then they sought footholds in the vibrating walls before them and began to climb, drawing the vehicle upward in their wake.

The buoyancy of the hoisting sphere, strained by a load and an ascent beyond its intended capacities, was beginning to wane; and so, if the energy of the mechanism was to hold out for coming work, it must be supplemented.

UPWARD the two went, risking the danger of great chunks of rock, which, dislodged by the quake, frequently came tumbling down from above. In actual distance it was not far to the top of the inner barrier from the place where the rocket had struck; but the going was almost vertical all of the way.

Hours passed, and weariness gradually took its toll. The inner barrier was scaled, but the end of effort had by no means been reached. The country still rose, and though the ascent was less steep, the way was continually encumbered by masses of broken stone. Temblors were much less violent here, however, and this was some advantage.

Treb led the way. Still aided by the sphere, they carried the rocket up a deep, winding gorge in which once, during this planet's warm youth, a mountain torrent must have cascaded. There was no light here except the amber glow of their flame mantles and the cold starlight.

Fine snow sifted down, whitening rock pinnacles. The silence was deathly. A few Tegati bobbed sluggishly in the gorge, like lost spirits.

The air was so thin now that it was very difficult to converse, except with hands in contact. The sound waves could travel along the channel of flesh and bone thus established, enabling the two from Wan to understand each other's speech.

While they were taking a brief rest from their exertions, Raah clasped hands with his tiny friend. "You do not know that we shall find what you are looking for, Treb," he stated quietly. "You only hope. Yet you do not wish to tell me that this is true."

"Your comprehension is complete, child of the unknown," Treb replied. "The land of the ancients is very big, and I have covered but a small part of it. I have never been in this place before."

They continued with their quest. More torturing hours dragged by. The minds of Earthman and Wanite became hazed with weakness. Treb staggered noticeably, his eyes glassy behind his flame mantle. Yet they could spare themselves only occasional moments of rest. The energy supply of their protecting auras, vitally necessary here in

the cold, rarefied atmosphere, was not beyond exhaustion, and so they must make their time count.

And at last their search was rewarded. They arrived at an open space between towering crags. Several tunnel mouths were visible in the starlight. The surface on which they stood was of smooth metal. Grooved tracks marked it in crisscross pattern, and curious vehicles stood motionless and deserted in the tracks. Treb had used such vehicles before, during the explorations of his youth.

"We go now to the metropolis?" Raah demanded anxiously.

"Perhaps, if to do so lies in the path of the future," the wizard replied.

He hobbled weakly about this ancient transport station, studying the odd symbols stamped at track junctures and above tunnel openings, seeking out among them the odd, irregular trapezoids which were the hieroglyphics for the chief city of the ancients. Finally he selected a car designed to carry freight. It was fitted with a curious, cradlelike rack.

Using the sphere, Raah and he hoisted the rocket ship into the vehicle. Then they entered the Earth-made shell, sealing themselves within. There were no controls to adjust, for the operation of the car was automatic; or maybe there was some delicate guiding apparatus which could respond to the telepathic waves of a living will.

In a moment the vehicle was moving toward a tunnel mouth. The vibration of its progress became almost impossible to detect as it tore on at mounting velocity through heavy darkness. It was looping back toward the east, through the successive ramparts of Wan which rose to ever greater and greater heights, mounting toward a region as airless, nearly, as space itself.

The exhausted bodies of the wizard and his companion cried out for sleep; but they felt thirst, too, and hunger.

Since they had been forced to act on impulse, they had made no preparation to meet either.

A tentative exploration of the rocket's interior revealed only a small flash of water and a box of strange wafers of concentrated nourishment, which neither of the two primitives could recognize as food. There were several flasks of oxygen, however; and Treb's chemical knowledge was sufficient to recognize the gas and to understand its importance.

The adventurers moved switches on their metal caps, dissolving their auras momentarily while they wet their lips with moisture from the flask. Then they lay down to sleep, with their flame mantles active. Treb was suspicious of using the Earthly oxygen, thinking it best to conserve it.

VI.

WHEN Raah awoke, the ancient vehicle was shooting along its grooved track, under bright stars. It was clear of the tunnel. Shadowy rocks and mountain crags fled past. After several more minutes of progress the car slanted down into a deep pit. It passed through a circular gateway in a vast wall of black stone. Looming all around now were the spires and domes of a slumbering antiquity.

The car came to a smooth halt beneath a colossal, phosphorescent rotunda. Treb had visited the metropolis before, and so he knew his way about.

"We are here," he said. "We are here in the place of uncertainty, where anything may seem possible. Here we must wait and rest until the coming of dawn. And then— We must go to a place of refuge, and we must seek food and drink. Our flame mantles wane in strength, and if they are inactive for a time, the caps will draw a little fresh energy from the forces of space. Come. Fortunately, our path

lies through a building of many wonders."

When the wizard spoke of "the forces of space," he meant the cosmic rays. All ancient machines drew their power from them. The old-time lords of this region had learned to concentrate the rays, hastening the process of charging any given piece of apparatus.

They left the shell and strode across the great room, threading their way among many deserted cars that rested in grooved tracks. They saw nothing that moved or breathed, yet the attenuated atmosphere around them seemed to swarm with elusive presences, suggesting in a way that was not visual the machines and beings of another era.

Perhaps something invisible *was* here—something belonging to the realm of fine, etheric vibration—that endured from the last days of glory. Or maybe the ancients were not truly gone at all; maybe their science had surmounted the difficulties of existence even here in this dead place.

Staggering a trifle because of cold and hunger, Treb led the way through a broad courtyard and along a street. Presently he and Raah reached a gigantic edifice which we might call a museum, though it was not that exactly. Rather, it contained what was meant to produce a colossal illustration of the cosmos.

The two from Wan moved slowly now, and cautiously; for Treb was warned by past experience. As they passed through the monumental gates of the structure, Raah knew that he was on the threshold of incredible revelation.

He soon learned that it was not a material revelation—there were no rusty relics here, no crude models wrought in simple material form. Instead, there was something in this place that acted upon brain and nerve tissue, to produce visions of strange, phantasmal vividness. It must have been some form of

telepathic wave, mechanically amplified, and drawn, perhaps, not from any sort of living mind, but from a mechanical record.

The two from Wan lost all sense of contact with their actual surroundings. The bright starlight from the entrance of the structure was blotted out, in so far as their sensations were concerned. Even the stone pavement under their feet seemed to vanish, and they floated in a rayless gulf which some subtle intimation told them represented the two most eternal things—time and space. Always they had existed and always they would exist; a condition or state without them was inconceivable.

Matter and energy, too, were eternal, though they were interchangeable and constantly undergoing various transformations. As if in direct rapport with some colossal intellect burdened with the wisdom of the ages, Treb and Raah grasped these simple truths. And other truths crowded into their minds in bewildering succession.

AGAINST the darkness around them they saw great, nebulous clouds swirling and contracting, forming at last hot, young stars. They saw those stars pass close to each other, pulling from each other's substance the hot droplets of planets. They saw those planets cool, and they saw life spring up on their surfaces—life born out of a special and temporary process which went on within the stars themselves.

They saw that life develop, bent and molded by various environmental conditions, into myriad, diverse forms; and they beheld some of those forms rise toward perfection, in which seemingly complete control of natural forces is achieved, only to be wiped out again in various, cataclysmic ways.

All this appeared chaotic and disordered; but then there came another subtle intimation to Raah and Treb: There was no such thing as disorder.

All that happened and existed was ruled, not by chance but by certainty. The law of cause and effect, absolute and unchangeable, made it so.

A given group of causes, if completely taken into account down to their last-minute detail, could produce but one result: Causes lying in the past not only influenced events of the present, but absolutely dominated them. And causes lying in the present exerted a similar dominance over events of the future.

Thus, things to come—both the slightest and the greatest of them—were just as fixed and definite as the things that had passed and had become history. Even minute electrons and tiny waves of the ether did not possess free will, but were rigidly directed by the law of certainty.

And even living intellects, which seemed so independent in thought and action, were not really free at all, but were ruled and swayed first by heredity and then by circumstance.

Time and space were both circular. If one moved far enough in either, one came back to the point of starting. The universe was finite but unbounded; and in anything finite there is a limit to possible combinations. Thus, there must be repetitions. Worlds that had once been would be again, repeating their ancient course of history. In the gulf of infinite time, the past must inevitably become the future, and the future the past.

Thus, for the first time, the immutable course of destiny was revealed to the young Earthman. Treb had experienced all this before; hence, he was less affected; but out of the miraculous grandeur of it, he, too, must have drawn a sense of solemn peace. Human thought on Earth had conceived ideas such as these, but they had been only theories. An older, wiser science had probed the universe, and had proven the truth.

Teacher and pupil, both humble, both awed, emerged at last from the black fog of rapport with greater wisdom. They were in a real room now, crowded with machines arranged in orderly rows. But there was nothing here to aid them in filling their needs. So they continued on, out into the frigid, moveless glory of the night.

Grown amid crumbling walls were bulbous things, massed closely together like gigantic soap bubbles. They were plants, or rather, parts of plants that had adapted themselves admirably to the rigors of their environment.

It was these growths that Treb sought. His primitive ingenuity had found them useful on his other venture; and now they would be useful again, providing the means of survival for himself and his friend until the sun shone once more.

He approached one of the largest of the bubblelike mysteries, and with a bit of sharp rock ripped an opening in it, close to the ground. Instantly, dense air puffed from its interior; but the tough, gummy texture of the balloon-like dome of translucent vegetable matter was sufficiently rigid to prevent its collapse when deflated. Treb crept through the opening, motioning Raah to follow.

The elasticity of the material caused the edges of the rent to close together at once, and adhesive sap, warmed enough by the warmth of life to flow, in spite of the cold, would swiftly knit those edges together again, making the growth as sound as if it had never been punctured.

Treb grasped his friend's hand for communication: "There will be new air here presently," he said. "All these queer hollow bladders are connected, forming a colony. And so air will be admitted here from the others, since no individual plant must be allowed to perish."

Any terrestrial savant, given an op-

portunity to examine this bizarre vegetation, would have been dumfounded at the simple way in which life can sometimes surmount terrific obstacles to its continued existence.

The glutinous domes covered the more delicate parts of the plants, protecting the latter from cold and confining the necessary atmosphere and moisture. The latter—both air and water—had an interesting origin. Hoarfrost, both of moisture and of carbon-dioxide crystals—the latter congealing out of the free atmosphere of this region during the colder parts of the night—was the chief source of both.

Tendrils, which were developments of the root structure, groped up sluggishly at dawn through holes in the soil, raking the crystals together and drawing them underground, where they melted later in the day. The water in the frost thus reached the roots, while the carbon dioxide arose into the domes in gaseous form, there to provide the raw material for starch and oxygen.

After a moment air came hissing into the dome that Treb and Raah had invaded. They dissolved their flame mantles and breathed the chill, musty gas. It was highly oxygenated and could have contained but little nitrogen, the inert part of it being chiefly carbon dioxide—which, while not specifically poisonous, was somewhat detrimental to the metabolism of animals and men. But Treb had done his best. Being here was better than suffocating in the brittle cold without.

VII.

SHIVERING, the two groped about in the weak starlight that found its way through the translucent dome. Their hands came in contact with masses of hairy stems, slightly warm to the touch. Like animals, these plants manufactured their own heat, probably in much the same way. The stems were tipped

with small, globular knobs which might have been seed pods.

Treb, whose eyes were better adapted to the dark than an Earthman's, picked some of the knobs and crammed them into his mouth.

"Food," he said. "Not good food, but better than nothing. And there is juice, too, to quench our thirst."

They ate the bitter, acid fruit. Then they wrapped themselves in the warm stems around them and prepared for a long period of slumber. Worn out, Treb soon fell into the comalike state of hibernation, natural to his kind.

But Raah did not have the same ability to woo Morpheus. For a long time he stared up at the dome, thinking, with a furious, maddening intensity, of the things he had seen and experienced, and of the colossal riddle of his home planet, which he could not quite place in the scheme of things.

And so it was during most of the long, long darkness. He had accustomed himself to the conditions of Wan, and in so far as the duration of day and night went, they were practically the same here. But his sleep was fitful and was punctuated by visions of a hell on a dim, foggy Earth which was little more than a legend to him.

Over all his thoughts of danger, horror and tension was the beautiful face and pert figure of one whose name he did not know. Ellayne Maynard was a mystery that disturbed him and fascinated him in a way that he found hauntingly sweet and utterly new.

And so, finally, came the quick, ghostly, colorless dawn. The Sun was a corona-wrapped disk of dazzling brilliance. Shadows were long and dense, and suggestive of frozen death. Slowly the solar rays crept down into the pit of the incredible city. The gray soil, born of ancient volcanic ash, processed by the erosion of ages, glared dully with reflected sunshine.

The spires and ramparts of the

metropolis caught the slanting light in their grotesque and fanciful arabesques. Quartz rotundas, which must once have confined air, glittered ethereally. And outlandish plants, protected by flexible bubbles which were part of themselves, began their daily growth and activity.

Raah felt the stirring of vegetable stems around him. He arose and peered out upon the new morning. His head ached dully from the effects of the obnoxious air around him; but because it was necessary he began to feed on the sour fruit of the stems within the dome. Treb was presently awake and doing likewise.

"Perhaps soon you shall see the world of your ancestors, as I have seen it, long ago," the wizard said. "Within a little time we will be able to answer much of the question of success or failure. Much depends on what punishment our flesh can endure. Come."

Protected by flame mantles, renewed to some slight extent but still weak, they broke out of the huge bubble that had sheltered them. The viscous sap that flowed in it, more sticky now in the sunshine, could not cling to their substanceless auras; but it was easy to imagine what would happen to any stray Tegati who chanced to foolishly attack a colony of this vegetation.

The adventurers did not pass through the place of revelation on their return to the rotunda where they had left the rocket ship, but strode along its massive outer wall. It was necessary to shift the rocket to another car; but this caused little trouble, for Treb had traveled to their present destination before, and knew exactly what track to follow.

PRESENTLY the car which now bore the shell from Earth moved slowly around a curve and along a grooved track which headed up, out of the pit and across a plain which lay toward the rising Sun. Treb and Raah watched

from the windows of the rocket's cabin.

An hour after the outset, the car stopped in a tremendous gulch, pitted with mines and crowded with battered, Gargantuan retorts—relics of the mineral industry of an unthinkable antiquity. From here the track did not continue.

"Now comes the real test. Now we must carry the ship," said Treb.

The gulch was very deep, pocketing air that was unusually dense for this region. It swarmed with roosting Tegati. How they could have reached this place was a wonder, until one saw the mine tunnels. Some of them must have rambled far back through mountain ranges, opening into lowlands where air was denser, and providing an avenue through which the Tegati could come and go.

Utilizing the remaining energy of their hoisting sphere to help them, Treb and Raah bore the space craft straight into the packed host of Tegati.

Had not the creatures been sluggish and inactive, the two invaders of their realm would undoubtedly have been killed; for sharp, poisoned fangs and claws directed with any enthusiasm could have punctured their enfeebled flame mantles.

Even as matters were, going through the deepest part of the gulch was a ghastly experience. The repellent monstrosities were everywhere. They impeded walking; they clung to the space ship like swarming bees, and their forms, bouncing lazily from the ground, made vision for any distance impossible.

But Raah and Treb won through at last. In the rising slope and thinning air at the end of the gulch, the Tegati deserted them.

The next two hours, however, were filled with the sheer, maddening torture that flesh can feel when opposed to conditions with which it was never meant to cope. More and more tenuous grew the atmosphere the two from Wan

breathed, as the altitude increased, and the strength of the flame mantles waned.

Without Raah's help, tiny Treb would have faltered and given up many times; but the strong young Earthman was driven by a determination that seemed to carry him beyond even the limits of his body. There was so much to call him, to beckon him—to insist that he reach Earth!

Thus, driven by an instinctive animal persistence when reason had grown fuzzy, he reached the top of the last jagged slope, and saw, notched between the serrated peaks of two mountains, a mottled, gray-green globe which glimmering consciousness told him was the goal of his dreams and his efforts.

Grandly it hung there in the black sky, just above the horizon. The designs of Europe, Asia, and Africa were unmistakably visible through the haze of the planet's atmosphere. This, beyond question, was Earth.

The world in whose reverse face the valley of Wan nestled was the Moon. It was the proximity of Earth to Luna that had made Wan possible. The two worlds had been born together, dragged out of the substance of the Sun by an invading star. They had come close together in space—much closer than now. And the Moon had had to yield to the molding effect of her larger sister's fierce attraction.

First it had slowed lunar axial rotation until always the satellite must keep one face turned toward its primary. Then it had pulled and distorted still, plastic lava, causing the Earthward side of the Moon to bulge, and leaving the other side slightly concave.

On its Earthward half, Luna had no atmosphere except for a tiny trace. But the other half could not be so easily looted by the covetous fingers of terrestrial gravity. Cupped and protected there in a deep valley, some of it would surely remain through many future ages.

Treb was limp and unconscious now, and had been so for several minutes. Raah had been carrying him with one arm, while with the other he shoved the rocket forward. The supporting sphere, not quite run down, had held out. Its energy was still sufficient to hold the space craft an inch or so off the ground.

The nose of the vehicle was pointed straight toward the disk of Earth. With the remnants of his expiring powers, Raah entered the rocket with Treb and sealed the hatch.

Then, rough with wooden clumsiness, he jerked the throttle wide—much too wide for a sane take-off. There was a dazing roar, a smothering thrust of acceleration.

Wanite and Earthman were hurled to the rear of the compartment. As the rocket cleared the Moon, they lay bloody and motionless in its cabin.

VIII.

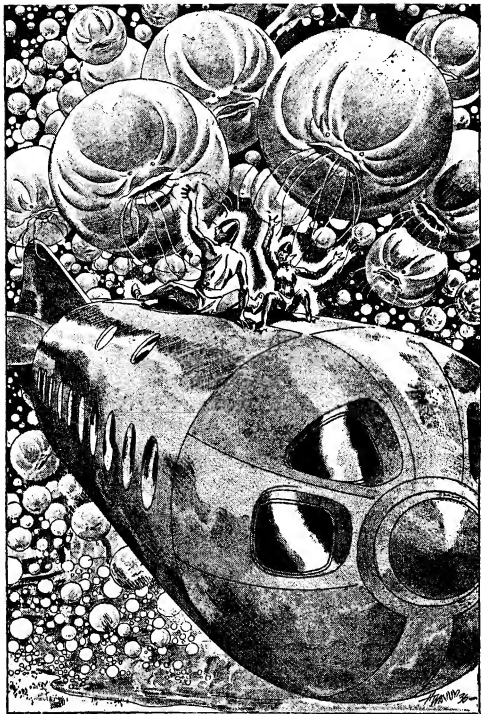
THE PLACE was the Kansas City refuge. It was after sunset. Into the sky, made murky by the effluvia of an alien form of life, a man peered with a large telescope. The expression on his angular, æsthetic face was eager and intense with the puzzlement of discovery.

He turned to the girl beside him in the glass-domed chamber. The curve of his lips was almost one of mischief. "Funny things happen, Ellayne," he said. "Here. Have a look!"

Ellayne Maynard frowned quizzically, then peered into the eyepiece of the telescope. Swimming close to the lunar disk was a tiny speck of flame. The girl's reaction to the sight of it was less cool than her companion's had been.

"Amy Forster!" she burst out. "Amy Forster returning, after spending twenty years on the Moon!"

Roland Maynard nodded. "Yes, sis," he said. "I don't think that anything but a rocket could make that speck of light. And probably Amy's piloting it;



Slowly, pulled by the hoisting sphere, the rocket gained another hundred yards of altitude. Tegati circled and bobbed around it.

AST—10

though, by a bare chance, it could be somebody else. It could be a Lunarian—or it could be—Amy's child."

Brother and sister faced each other with mutual expressions of worship for the tragic heroine, whom Roland could not remember very clearly, and whom Ellayne had never seen at all in the flesh.

The girl nodded. "Dad used to talk so much about Frank and Amy Forster," she said. "Both of 'em were nuts about stratosphere planes and things—so nuts that their experiments always kept them broke. Then, just before the meteors came, and the Sun began to act up, they finished building the first practical space ship."

Both of the younger Maynards knew the story perfectly. Frank Forster had piloted the rocket around the Moon; but on his return, the landing 'chute of the craft had failed to work. He had crashed to his death.

But the notes and photographs he had taken had survived the accident. Amy had gone through them, had found something—something that had given her hope that the hell scum might be conquered. So, though she was going to have a child, she set out in another, better space ship, equipped with a smaller rocket, which would provide for return after an actual landing on the Moon. She had had to go, because there was no one else who knew enough about ether flying.

"If Amy's coming back now, that'll mean that maybe there's a chance for us poor devils to survive," said Roland.

Ellayne shrugged. "Let's talk about something less harrowing with suspense," she suggested. "Tell me about dad's creation theory. I've had so much to do, I've scarcely had a moment to listen to a clear presentation of it."

"Well," Roland replied, "I'll give it to you in brief first, and discuss its aspects afterward. Life had to begin somewhere, you'll admit, even if that

beginning was on a planet of another star. But dad thinks there was a separate beginning for each solar system. He says that during a certain brief period of their history almost all stars throw off a certain combination of corpuscular and etheric radiations, which acts to create simple life on the planets of those stars.

"All right. That's dad's idea. The physicist, Benson, made careful tests of the Sun's radiations when it was giving off green light. Nobody paid his work much attention then, and probably he didn't think it particularly important himself. But, mixed with the green light—which was just plain green light—he found emanations somewhat like the corpuscular alpha and beta rays of radium, and other radiations belonging to the realm of etheric vibration, like light and cosmic rays, but of shorter wave length than either.

"Coming, as these emanations did, just before the beginning of our troubles, it was natural to suspect a connection. Just how close that connection seems to be was not apparent, however, until dad tested the meteors and found them all sterile and sporeless. There had to be some other source or course of the hell scum. So he constructed his theory. Circumstances alone—the mere fact that there is no other explanation for what has happened—is almost sufficient proof that the idea is fact.

"WHAT happened was this, as dad sees it: The vast cloud of meteors which came into the solar system was largely absorbed by the Sun. The shock of those falling stones from space did things to old Sol. Maybe he felt younger, or something. Maybe materials which exist in his center to-day, but once were also part of his photosphere, were caused to rise briefly to his light-giving outer shell by the impact of the meteors. There those materials or elements acted to produce the radiations,

perhaps by the disintegration of their atoms. Any comments or questions so far?"

"Yes," Ellayne replied. "Life and rays of any sort are a long way apart. How can there be any connection?"

"You're all wrong there, sis." Roland responded earnestly. "Everybody knows that without the Sun's rays there couldn't be any living creatures on the Earth. To green plants light is food, and without those plants there wouldn't be any animals. And there are other facts to consider when judging the Maynard theory:

"X rays and the radiations of radium exert a tremendous influence upon both fauna and flora grown where they are present. Experiments of this sort were conducted many years ago. Normal young of any species developed into freaks or sports, quite different in physical characteristics from their parents. Brown rats became albino rats. Fruit flies were curiously distorted.

"It has long been suspected that the radium present in mountainous regions is a powerful cause of mutation, which furthers quickly the progress of evolution, both animal and plant. Cosmic rays and the periodic radiations of Sun spots have been accused of exciting comparatively innocuous bacteria, thus producing terrible plagues.

"So, you see, radiations of various kinds can direct, control and sustain vital processes. To suppose that the first primitive life was actually created by a combination of special and transient solar emanations is just another step in connecting this evidence with the great scheme by which our universe operates.

"Think of the warm, azoic seas at the beginning. Nothing lived in them, even though conditions were ideal. The world was like a tinder pile, waiting for the spark of life. That spark might be, in part, an arrangement of the elements

involved—nitrogen, oxygen, carbon, and hydrogen—but a condition that was special and inevitable could aid enormously. Our present visitation began a little differently, for the radiations were stronger than the original ones, and they didn't last nearly as long. The creation of the scum was more sudden than the first creation. I guess that's about all I can say, Ellayne."

The girl nodded slowly, her mind lost in her brother's explanation of the great riddle. But abruptly her thoughts came back to the practical present. She moved to the telescope.

"We've got to plot the rocket's course," she said. "We've got to know exactly where it is going to land. Maybe Amy Forster will be able to tell us what to do."

Around the refuge, green slime oozed, its corrosive acids eating metal and softening earth. Beyond the walls men fought the dread menace; while within those walls other men thought and planned and toiled. One of them—a gray, old scientist who slaved in his laboratory, had an idea, among his other ideas, that might make Earth a safe place for human habitation once more. But time was so limited—

IX.

RAAH OF WAN stirred and opened his eyes. There was no sound in the frosty stillness. A glance at the windows of the compartment told him that he was in space.

Raah raised himself, feeling dizzy, ill and sore. But his own injuries were superficial. His first concern was for Treb. Both the Wanite and the Earthman were at the rear of the compartment, where the jolt of acceleration had thrown them.

The furry little Lunarian was half buried in ruined glass and metal. His body was stiff and cold. Raah extricated him from the wreckage, wiped the

gore from the great oozing wound on his shoulder.

Then, for several moments, he chafed the tiny, three-fingered hands of his small friend. This producing no immediate result, he looked about for something to wrap Treb in, and presently found a blanket in a locker. Raah did not know what the blanket's intended function was, but he used it to good purpose.

There was nothing more that he could do for the Wanite wizard. And so he crouched dumbly beside him, waiting and hoping for a sign. Once Treb voiced a few plaintive, birdlike twitters, and then lapsed again into a coma.

Concern forced Raah's attention to other things. The meters on the broken instrument panels could give him no information now, even if he had been able to read them. But he could look through the windows and learn much. The Moon had dwindled astern, while the Earth was now a huge globe ahead and a little to the right.

The ship's propelling mechanism had flamed until all the fuel had been burned up; now all was silence.

Could the craft reach Earth? Raah had used no mathematics to plot his take-off. The ship had been pointed, very simply, toward its destination; that was all. Time units, and the movements of celestial bodies involved had not been taken into consideration.

It is a far simpler task, however, to reach Terra from Luna than the reverse. Earth's gravity, much stronger than that of its satellite, naturally dominates a much larger portion of space, and would tend to correct any slight errors in aim.

Moreover, since the Moon always keeps the same face turned toward its primary, the Earth, except for the small shiftings occasioned by libration, does not move in its sky; so, relatively, the position of Terra from the lunar point of view, changes scarcely at all.

But how about landing? What provision might this primitive savage make for so delicate a task at so great a speed? Or had such provision been made by the builders of the vehicle?

Such questions could give Raah little worry, for his knowledge of the factors involved were too slight. He could only crouch beside the silent Treb, sullen with grief and loneliness.

Presently he noticed the stuffiness of the air. He opened the valve of an oxygen flask slightly, and after that he felt a bit better. His and Treb's flame mantles had dimmed until they were almost invisible, even in the semidarkness. Since they were useless now, he shut them off.

Time dragged slowly by. The Earth was nearer now. It did not take long to consume many thousands of miles while hurtling through the frictionless vacuum at terrific speed.

Finally Treb became conscious enough to speak a few, halting words. There was hope, and a doglike affection, in his great, glazing eyes.

"I think—everything—will be well—child of—the unknown," he said, seeming to draw wisdom from some source beyond his own personal experience.

The Earthman touched his tiny friend's forehead reassuringly. "Everything will be well," he repeated.

In so far as Treb was concerned, everything was well within an hour. While the rocket sped on toward grim adventure, he passed into the kindly shadows.

Other hours went by, and Earth appeared to creep nearer and nearer until it was a vast, slightly convex expanse of blurred gray, reflecting bright sunshine. Oceans and continents swept beneath the rocket, as the planet turned slowly on its axis.

AT LAST a faint whispering filled the narrow compartment. The craft had touched the terrestrial atmosphere.

The whisper mounted to a shrill hiss. Then there was a slight grating sound astern, followed by a sharp jolt, which was the beginning of the thrusting, crushing agony of deceleration.

Flattened, pain-racked, against the forward extremity of the chamber, Raah could see through the windows the vast parachute of metallic fabric which had opened up in the still tremendously tenuous air. Had the 'chute been drawn from its metal case astern by a denser medium, the terrific speed of the ship would have torn it to shreds and burned it like a meteoric fragment. But here the resistance was not so dangerous. For once the landing device of a space ship appeared to be working as it should. Twice before, there had been failures.

Impotent as a scared animal, Raah waited. He felt the creaking and straining of the stout shroud cables of the 'chute. Then there was a snapping jerk, as one or several of them parted. After that the pressure of deceleration was not as intense.

Down through the atmosphere the rocket fell, its speed still rapidly diminishing. A broad, murky plain was rushing up toward it. Raah saw the sad, jagged skeleton of a ruined city leaping closer. Then the crash came.

Somehow his senses were not quite wiped out by the impact. Gradually, the initial numbness of shock gave way to searing torture. His left arm was broken; his ribs were cracked; his brain was jangled, until the least attempt at coherent thought was aching effort.

Weakly, gripped by a gravity six times as strong as Wan's, he dragged himself to a shattered window, muttering words to the dead Treb. As he looked out on the alien world of his ancestors, nostalgia came over him like a wave. The very daylight seemed obstructed by the pall of doom.

Thick, pulsating slime, like that which had once floated on the surface of Ikaah, the devil lake, was everywhere. It in-

crusted the hills and the plain, and the hideous shreds of it dangled from the deserted wreckage of the city near by.

The spectacle aroused in Raah a mighty wish that he could go back to Wan—even the fiery, quaking Wan that he had last seen. It was a better place to be than this horrible, murky planet of death and swarming, primal life!

Then he remembered that this was the world of his people, and of the girl whose fresh young beauty had captivated him. His haggard face hardened.

If he was to accomplish anything, he must act immediately; for he did not know how long his depleted stamina would last.

He crept to the hatch of the crumpled rocket. A moment later he stood unsteadily atop the battered vehicle, fighting his weakness and his new and unaccustomed weight. The hoisting sphere might have helped sustain him, but it had been lost in space.

The musty air was humid and hot. Though he did not know it, the presence of the alien hell scum had altered Earth's climate, so that snow and ice did not form, even in the extreme north and south. The character of the terrestrial atmosphere had been changed; more carbon dioxide, resulting from the vital processes of the scum, had been put into it, increasing its capacity to absorb and retain the warmth of Sunshine. The resulting hot climate had also made the air much more than normally humid, providing a source for heavy rains, which had defeated even the driest deserts on the face of the planet.

Vaguely Raah heard a distant, droning sound; but it scarcely registered on his numbed faculties. And so, moved by impulse born of the desire to reach his mysterious people, he lowered himself from the broken rocket. He sank to his knees in the sticky, squirming ooze, which, under a microscope, would have revealed itself to be composed of

minute droplets of protoplasm, part animal and part plant.

At once his agony increased, as the minute creatures tried to absorb the flesh of his bare legs. Now he moved the switch on his metal cap, but the flame mantle thus recreated was far too faint to provide any real protection.

Voicing a thick cry, he swooned, his body toppling forward into the voracious slime. Raah of Wan had been strong and courageous, but flesh has its limitations and there are problems which even the keen, trained minds of scientists cannot solve.

He was not aware of it when a plane's pontoons splashed into the scum and glided toward him. Young hands, protected by the gloves of air-tight armor, raised him and carried him into the craft.

X.

A WEEK passed, during which Raah was the victim of a fevered delirium, which was perhaps partly the result of exposure to microbes that were part of the hell scum. But in spite of his illness, he was conscious of a thousand novelties. Strange clothing covered his body; unfamiliar bandages swathed his injuries; he was lying in a curious white bed in a white room. Antiseptic odors were always in his nostrils.

Many people with weary faces and eyes bright with the terror of doom came to talk to him—and to plead with him. He could not understand their tongue, but he knew that they were pleading, and he knew why; but he had no information to offer them that would be of the least help. Sometimes he heard distant cries of fear, and felt the vibrating jolts of walls shifting on their foundations. He sensed that the end of this great Earthly fortress was not far off.

The situation, of course, had many aspects which even his sharp intuition

could not see. He could know little of the shortages of synthetic food, of the scarcity of poisons and other materials used in combating the scum. So many people had been drawn from the small populace to engage in the actual fighting that few remained to handle the less immediate, though just as vital, demands of manufacture.

And Raah could, of course, have no inkling of the countless, teeming thoughts that flashed across the busy brain of old John Maynard, toiling in his laboratory, struggling with a problem which he knew would yield in time, if the time was given him.

Only once did the scientist come to look at Raah; then he turned away with regret in his old eyes. This visitor from the Moon was scarcely more than a simple cave man, and could be of no help.

After that old John spent his scant moments of relaxation in the botanical and zoological gardens of the refuge, finding some scant, reminiscent comfort in the plants and animals that had belonged to the old Earth of his younger days.

With Ellayne Maynard it was different. She came to the hospital quarters as often as she could. Frequently she was weary and grimed from work in the factories; but she never seemed to lose her poise and her jaunty gayety.

Somehow, in spite of his illness and his apparent ignorance, there was a reassuring quality about this strange young man whose muscles were unusually hard and supple, and whose incoherent, alien words were softer and more beautiful than the words of any language spoken on Earth. Besides, there was an unmistakable resemblance between this stranger and Amy Forster, whose cool-eyed picture hung in John Maynard's study. This was her child, beyond doubt.

And so Ellayne studied the enigma he represented, her judgment vague but

hopeful. This boy was a hard one to restrain; always he was trying to get out of bed, apparently to join the battlers beyond the walls. Always he was calling some one or something named Treb.

Ellayne tried to talk to him, not so much in the hope that he would understand, as to relieve her own feelings. Mutual attraction was swiftly becoming mutual need; for to Raah the girl's visits seemed as essential to his recovery as food and rest.

"It's funny about you, Forster," she'd say companionably. "Maybe you don't even realize it, but your mother went to the Moon for a purpose. You see, when your father circled the satellite, he found that there was a valley on its hidden hemisphere. In his notes, which were read after his space ship crashed and he was killed, he mentioned that in so far as he had been able to discover, there was no hell scum in the valley, or at least not much. And that is something we can't understand.

"This was odd, because the Moon must be exposed to the same conditions—they weren't understood then—which had produced the scum on Earth. Some other condition, causing immunity, must exist there. So your mother went to find out what that condition was. It might help us out a lot if we knew. Did you happen to learn anything?"

IT WAS no use. Gaining mastery of a totally alien language is not an easy task for any one. Raah could understand the motive of the girl's obvious plea; but even if these two could have conversed fluently, it is doubtful that the man could have supplied information the importance of which a native Earthling could see.

"The cap you wore," Ellayne would continue, pursuing a different lead, "it has some interesting qualities, which, if we could analyze them, might prove helpful. But the thing's too intricate

for our scientists. Who made it, and how does it work?"

This son of Amy Forster could tell her nothing, and even if he had been able to reveal the secrets of the metal cap, the marvelous device belonged to a science too advanced to be handled by Earthmen. The most skilled watchmaker could not have built anything so intricate.

Another week went by; Raah's fever left him. With his broken arm still in a sling, he went out with the other battlers to sweep the scum back from the walls. Clad in a clumsy asbestotex armor, he wielded a little flame thrower sparingly, aping his companions' actions faithfully, though he could mimic only a few of their words.

Two days later all the fuel for the flame throwers had been used up. Through the night that followed, the defenders continued to battle doggedly, beating at the senseless, viscid enemy with shovels and with anything else that was available.

Then, in the wee hours of the morning, a radio message was received. It was from a plane—Roland Maynard's plane. He had flown to the Los Angeles refuge in the hope of getting aid, and now he was returning, without having been successful in his mission. Los Angeles was no better off than Kansas City.

But his voice buzzed excitedly in the speaker diaphragm before the weary and frightened listener at his home station: "Something new," he said. "Something very new and very queer! Just for luck, I flew over the place where the Forster rocket landed. Thousands of odd animals were circling and bobbing about the spot. They aren't Earthly; they can't be. There must have been eggs or spawn or something on the rocket—spawn from the Moon! It hatched, and since there's plenty of hell scum to serve as food, the things that came out of it have grown very

rapidly. . . . Don't call me a liar! Seeing is believing, isn't it, even if what you see looks cockeyed?

"All right! Now listen while I tell you what I think and what I'm going to do. I've got a hunch that these animals are the secret of the lunar valley's immunity from the scum. They ate it up there as fast as it could grow, and so the stuff never got a decent start there. Just an old case of biological balance. Cats used to keep the prolific mice in check, you know. But Earth, unlike the Moon, didn't have any sort of creature that could master the scum.

"Now, however, I'm sure the right kind of animals have been introduced here. The next step is to bring them to the vicinity of the refuges, where they will do the most good.

"I can see now that this isn't going to be a very difficult job. As soon as these crazy lunar devils spotted my ship, they tried to chase me, their object probably being to eat up both me and the plane. But the gravity is too strong here to allow them to fly very well, so I'm giving them a break. I'm doing a lot of circling at low speed and close to the ground, just to egg them on. But all the time I'm working gradually closer to you folks at Kansas City. That's all I can say for the present. Keep watching!"

RAAH OF WAN could not understand what was said when a man rushed along the straggling line of battlers beyond the walls of the refuge, shouting the news. But he could guess, by the awed looks on the faces of his companions, and by their fresh enthusiasm, that the news was good.

Comprehension came to him with the first gray streak of dawn. First he heard the distant throb of a plane motor, somewhere to the west. The craft glided low over the slimy morass which had once been the Missouri River; then it doubled back, approach-

ing the eastern wall of the great oval refuge.

In its wake, bobbing and bouncing over the hell scum, was a horde of black, ominous specks, silhouetted against the sky.

Sight of familiar objects in a foreign environment often gives an observer a pleasant surprise, even if those objects have once been looked upon with hatred and distrust.

"Tegati!" he yelled through the breath vent of his transparent mask. "Tegati!" For that was what they were, beyond question.

How had they come here to Earth? It took but a moment for Raah to find the explanation to the mystery. He remembered that deep gulch on the Moon, where an ancient mining camp had been located. The gulch had swarmed with thousands of torpid Tegati. They had gathered on the space ship as Treb and he had sought to bear it through their packed and sluggish masses, and they had deposited a quick-crusting jelly upon the hull of the craft. The gulch had been the spawning place of the Tegati, and the jelly had contained their eggs!

Though airless and utterly cold, space is not as hostile a region as is popularly believed. Heat can be lost by an object in only one way—through radiation. In a vacuum there is no such thing as convection and conduction. Besides, during part of the journey, the ship's rockets had supplied warmth. And last but not least, the eggs themselves, in their normal environment, were adapted to conditions almost as rigorous as those of the void.

Within several minutes the Tegati host was swarming about the armor-clad defenders. But the latter, protected as they were, were safe from poisonous fangs and claws.

They were small Tegati, Raah could see; even they could not reach full growth in so short a time. But with

food as plentiful as it was, there was small reason to doubt that their numbers would multiply rapidly, even under the alien conditions of Earth. These creatures were prolific.

They could not, of course, conquer the scum, now that it was deeply entrenched in an entire planet; but their powers were promising. At least, they might clear it from around the weakened walls and foundations of the refuges, saving them from destruction; and that was all that would be necessary.

In the gray half light, Raah saw some of the creatures settle on the scum. They bit into it savagely, lashing at it with the poisoned claws of their tendrils. The viscid stuff in their immediate vicinity quivered and died as virulent venom was injected into it.

The defenders began to cheer raggedly. Some minutes later, most of them retreated into the refuge. Only a small crew was left behind to make tentative repairs of the dangerous fissures in the walls and buttresses.

ELLAYNE MAYNARD met Raah in one of the public hallways. Out of sheer impish jubilation she threw her arms around his neck and gave him a hearty hug. "Maybe you don't even know how you did it, Forster," she said, "but that doesn't change the facts. My friend, you're tops!"

Raah wouldn't have minded the compliment, had he been able to understand it, but the situation otherwise was so entirely new, pleasant and upsetting, that he felt extremely uncomfortable.

But there was a quiet friendship and love in the girl's amber eyes in spite of her gayety, and it reassured the young savage a little.

"Thank you, Ellayne," he said in English that was soft and accentless. These were almost the only Earthly words that he knew. He understood the meanings of all of them, yet he was not quite sure why he said them now.

He only knew that he wanted to say them.

In the two remaining refuges—the one at Los Angeles and the one at Kansas City—despair became hope, and hope gradually was changed to certainty. Lured by three planes, some of the Tegati were transferred to the Los Angeles refuge. In a wide ring around the great oval structures, the aerial devils from the Moon poisoned and ate the scum. The seeping flow of destructive acids was stopped.

Ten thousand people, relieved of the burden and tension of defense, went back to work. Materials that were needed were manufactured. And at last John Maynard completed his invention.

Not long thereafter, a squadron of planes set out from each of the refuges. Both squadrons dispersed, their object being to circle the entire Earth in every direction, forming, with their various courses, a wide but consistent and all-enveloping network. At the end of every fifty miles of its flight, each of the planes ejected a puff of luminous vapor.

This vapor was no mere poison; its potency was far stronger than that. It was a subatomic reagent, which reacted with a tiny and insignificant quantity of the nitrogen in the atmosphere, freeing its atomic energy.

But though the quantity of the nitrogen that was disintegrated was small the power released was enormous. When the planes returned to their bases, there was already a very noticeable rise in atmospheric temperature. Occasional gusty winds blew, but they were not expected to become dangerous, for the heat was evenly distributed throughout the Earth.

No flames or similar phenomena were visible, but the thermometer readings climbed steadily, reaching a peak of one hundred and twenty degrees Centigrade,

or twenty degrees above the boiling point of water. No protoplasm, exposed to such heat, could live. The hell scum was dying, and with it, except for a few specimens kept for study, the Tegati.

For a month the broiling heat endured unabated, cooking the life from remnants of the scum which had seeped for a considerable distance into the ground.

Meanwhile, mankind remained within its concrete and metal refuges, sweltering but happy. Cooling systems made the temperature endurable. And at last the curing process was over.

It grew cooler. Heavy rains began to fall, laving the Earth, preparing it to receive its old familiar fauna and flora, for which the zoölogical and botanical gardens of the refuges could supply a start. Even the oceans were cleared of the scum, for the latter had existed only on the surface of the water. The dark inferno, springing from the fires of genesis that had burned out of time in the solar atmosphere, was at an end.

ONE DAY John Maynard called his son, his daughter and Raah to his study. On the wall beside his desk the picture of Amy Forster smiled a faint, almost amused smile. John Maynard could remember very clearly a gayer, sadder, more defiant smile on her face during the moment that she had waved

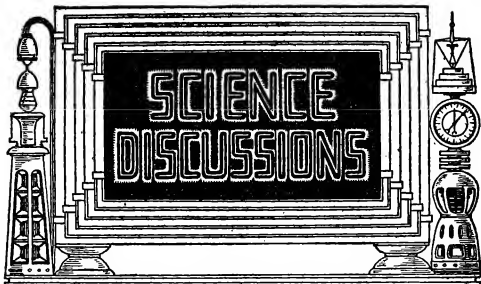
farewell just before she had entered the ill-fated Moon rocket.

"I don't know just why I asked you young folks to come here," he said. "Just to relieve some haunting feelings of mine, I guess. This should be a time of all times to think of the future. But we can never forget the past. That lady on the wall, for instance. No tribute we can pay her could ever be too great. Of course, we shall always remember her. But for her brave and tragic journey to the Moon, we would have nothing to look forward to; in fact, we would not even exist! Sometimes it strikes one as strange how the past rules the future."

Raah's knowledge of English was still far too limited for him to grasp much of the meaning of the scientist's words. Yet his own thoughts were of a similar nature, and his comprehension was more complete; for he had partaken of the wisdom of the ages in an ancient lunar city of a dead and glorious time.

He looked down at the girl at his side, and wondered, half in hope and half in awe, what days to come might bring. Between him and Ellayne there was a wide gap of training and background; still, he could learn. Perhaps she would even help him to learn. Yes, the gentleness of her eyes told him that she would.





AN OPEN FORUM OF CONTROVERSIAL OPINION

Point is Noted.

Dear Editor:

I have just received a sudden and rather unexpected jolt in this month's Brass Tacks. Mr. Campbell, I reverently admit, wields a wicked stylus. But now to business.

Mr. Campbell picked out my objection, of course. I disagreed with his statement, "pressure applied to either bromine or iodine immediately restores it to a liquid." My original letter had "iodine" and "liquid" underscored, but, unfortunately, these were not italicized in the printed copy, thus rendering my point rather vague.

I suppose I should consider myself squashed, huh? Well, I don't. I admit, of course, that iodine in changing from a solid to a gaseous state must pass through an intermediate liquid form. The trouble is that at normal temperature and pressure this change occupies such a minute fraction of a degree that for all practical purposes it may be regarded as an instantaneous change.

"But," says John W., "I'm talking about temperatures of 200° centigrade or more, and *unusually* atmospheres pressure."

Is that a fact? Then why not say so in the first place? From the tone of Mr. Campbell's letter, one would think he had. I can't see it. The only thing remotely bearing on the subject is the remark (over the page and a paragraph up) that iodine is active enough to support life at a temperature of 200° centigrade.

Liquid iodine, I'll admit, is possible under the extremes of temperature and pressure stated above, but I still consider these conditions were not specified in the original statement. If I am afraid I cannot rise to the invitation to look for flaws in Mr. Campbell's physics. Physics to me is a hidden mystery.

Biology and chemistry are more in my line. From the eye-wrenching equations I occasionally see flying around—witness the Kulesky-Von Kampen battle of two years ago, for instance—the business must be a pretty tough job, and the tracking of some elusive quantity to its secret lair through a forest of x s and y s and m - v 's is just not my idea of fun.

However, if I do happen to see anything I consider to be an error, I won't hesitate to say so.

One more thing before I close. I notice that in last month's Brass Tacks some one likened Astounding to a comet. Brass Tacks, they said, was the tail. A more sarcastic person than myself might remark that a comet's tail is composed mainly of hot air.—Randolph Vickers, 626 Constance Avenue, Victoria, B. C.

As to Ionization.

Dear Editor:

I am writing you in regard to a letter, written by a Mr. Chernoff, printed in the January Astounding. One statement in particular attracts me, "Only ionized substances take place in reactions." This statement, to me, seems to be not wholly correct. I will admit, however, that the great majority of chemical combinations are between ions. If powdered antimony is sprinkled into a jar of chlorine, a reaction immediately takes place, antimony-chloride being formed. As both of these elements are in the free state, ionization is impossible. I do not see how any oxides could be formed by ions, as the oxygen ion does not exist, to my knowledge.

"C. B. metals are not attacked by acids, but impurities must be present." I think that if Mr. Chernoff will analyze a few of the chemically pure metals he will find that they are not absolutely pure, but even if they were, what effect would this have upon the dissolving in acids. Also, the electric potential does not exist in solutions, but in chemical cells; it exists upon the plates of the cell.

I would rate the January issue as follows: *Beyond Infinity*, *S O S in Space*, *Metamorphosis*, *The Destruction of Amul*, *Linked Worlds*, with *Luminous Mine* and *Denizens of Zeron* falling way behind.

I like your editorial policy very well. It seems the most logical one I have ever seen.—Donald L. Ewing, 312 Maiden Lane, Lawrence, Kansas.

Yes, I Agree About Letters.

Dear Editor:

The new Science Discussions is a great improvement over Brass Tacks as it used to be. However, I feel, as do Mr. Andrews and others, that the old Brass Tacks should not be entirely forsaken. Up until the January issue most of the letters were quite similar—that is, most of them showing some definite trend. I always felt that a lot of space was wasted in printing so many letters that had essentially the same idea.

Could you not print a few unscientific letters that have unusual and different themes? Of course, printing us many, or better yet, more letters of the Science Discussions type. Also, you should encourage readers to write to you, not to Brass Tacks, as is the present tendency. The January Brass Tacks was rather skimpy, but that was probably due to the lack of letters of the type wanted now. You will, no doubt, have more support in the near future.

I believe Mr. Crouch to be correct in what he says about Martians evolving to where they need little air. Is it not being very narrow-minded to suppose that all life requires the same conditions we do to survive? If one believes in the Darwin theory of evolution, what Mr. Crouch suggests is not at all hard to take. If life evolved from one-cell sea animals, as it supposedly did, then being gradually able to do with less air is but a mere step in man's or other being's development.

As to bacteria increasing in size due to there being no other animal to devour them, as they did in Mr. Fearn's *The Dynasty of the Small*, the only reason I can see for any abnormal growth would be that they could spend more time eating and less in strenuous exercise dodging some other microscopic animal in search of food.

I was a bit puzzled by *S O S in Space*. Would the shower of concentrated electrons be luminescent in space? Their brilliance would quite probably be caused by heat, but from whence the heat? There is, to the best of our knowledge, not enough tangible substance in space to cause sufficient friction for heating, even electrons, white hot. Meteoric dust is not even faintly visible, because of its own light, until it enters our atmosphere. The heat could not have been caused by exploding atoms for obvious reasons too numerous to mention. All of the preceding statements have been based upon my own limited knowledge. Possibly one of your readers could give me a little help if I have slipped somewhere. (Yes, I'm still in favor of editorial comments.)

By the way, did you pay Mr. Campbell anything for his last letter? (N. B. No.) Its interest and entertainment qualities rivaled even his regular articles. If only more authors would come to their own defense when some fan disagrees with them!

You really deserve congratulations. When have three such splendid novels ever been in the same issue of a magazine as when *Beyond Infinity*, *Metamorphosis* and *Infra-Universe* were in the January edition. The former proved decisively that a story may have a limited amount of "blood and thunder" and still be far from hackneyed. I don't expect to again see a story that good for a long while. Try to fool me, though, if you can.

Would it be too much to ask for cover and interior artists to get together? Quite often they don't agree as to the appearance of an object or scene.

Your stories seem to be getting more scientific. Keep it up please.—R. A. Squires, 174 South Kenneth Road, Glendale, California.

Life and Air.

Dear Editor:

Well, here I am, like the proverbial bad penny, turning up again.

I would like to answer Leslie A. Crouch's

question, "Could life exist without air?" with an example.

Take a candle for instance. Suppose you were to withdraw the air ever so slightly until the candle burned with very, very little air. But, when you withdraw the air altogether, the candle will go out. In my opinion, the same would hold true in the case of human beings.

The best story in the issue was *Metamorphosis*, but the ending was rather unsatisfactory. The best author, consistently, is Nat Schachner.

Now comes my kick! Your serials! Do away with them. I hate to wait a month to finish a story, and I know others feel that way, too.

Yours for an astounding without serials.—Allen Encelow, 3225 West Street, Holliday's Cove, West Virginia. P. S. I would like to correspond with boys between the ages of 15 and 18.

Timely Repetitions?

Dear Editor:

I think this letter should be worthy of Brass Tacks. It has taken me 3 years to write it! Yes, I have been reading good old Astounding for 3 years and never voiced a comment.

Congratulations on the improvements, especially trimmed edges. Keep up the good work. Of course, I don't like every story, but it would be impossible to please every one at the same time. I think other readers should take this into consideration when they comment on "lemous."

I agree (practically) with every one else. Wesso is by far your best artist. I, also, would like to see him do a cover. Brown is better than your other artists though. Wesso's illustrations of *Frictional Losses* are the best I have ever seen in any pulp magazine.

Your magazine is not only entertaining but educational. For instance, in the November issue I found, in the Science Feature, many things about Mars that I never knew. From Brass Tacks I learn the formula for centrifugal force, etc.

Science Discussions? Here is something that might come under that heading. Have any—or all—of your readers ever experienced the sensation of repeated occurrences? Have you ever been in a place where you were sure that every object was in the same place, every person in the same position and every word spoken the same way, and felt the sensation that it had all happened before? I have had this sensation many times and cannot determine whether the occurrence *re-* happened before, whether it occurred in a *re-* or whether the whole thing was a product of my imagination.

Two friends of mine have had similar experiences. One thinks he dreams of the event and then it occurs, although he has no proof. The other has no theory. I can see a possible explanation in Kundo Boder's theory of time. (*The Time Entity*, October issue of Astounding.) I would like to hear from other readers upon their experiences or explanations of this.—Albert T. Stone, Massachusetts Avenue, Fitchburg, Massachusetts.

Very Interesting.

Dear Editor:

Rise to arms, fellow readers! We have been ridiculed; we have been accused of reading fairy stories. Yes, an English woman by the name of Cleomeuse Dune in her article "The American Fairy Tale" appearing in the "North American Review," Autumn, 1935, has made the accusation. Remember *The Einstein Express*? She quoted from that serial to prove her point that we are reading fairy stories. The term "thought-variant" was also poked fun at. *Wonder Stories* and *Weird Tales* also received their share of ridicule. However, she admitted that Astounding Stories was the most original of the three. I wonder how she missed *Amazing Stories*!

Read the article for yourself and think of all

the refutation that flew through my mind as I read the essay.

"The House of the Labarums," by Mollie Panter-Downes in *Harper's* for December, 1936, is a short story based on prevision. That is all I will say.

For the serious reader there is an interesting article in *Asia* for December, 1936: "The Coming Golden Horde," by Ivan Nardony. New miracles are being born in the East. The oracles prophesy the advent of a new religious leader. In fact, erection of a temple in the Gobi Desert, thought to be the most ancient seat of civilization in the world, and the question is raised: will it be the seat of a new, wonderful civilization?

More next time if the readers like such mention of recent articles and stories appearing in current magazines.—Donn Brazier, 3189 North 41st Street, Milwaukee, Wisconsin.

Calisthenics in Time.

Dear Editor:

With Science Discussions, Astounding Stories will make a name for itself. The main reason for this letter is to make public this idea that I have in mind.

Before I tell you and the readers of our magazine my theory I would like to give you my opinion of the past twelve issues for 1936.

Strange City and its sequel, *World of Purple Light*, were two of the best stories I have ever read. *The Comets*, *The Incredible Invasion*, *Spaces of Eternal Thought*, and *Infra-Univers* were the best serials that you have ever printed, besides *Rebirth*.

The best complete story that you printed, from my point of view, was *Mathematica*.

Now for my theory: Is there a limit to numbers? I will attempt to answer this question.

An inch can be divided a limited amount of times, but not so with a second of time. Since we could not slow up a second of time physically, we shall be content with doing it mentally. Let's think of this second just begun. As time passes this certain second has half passed. Then another half of the remaining half second is passed. We have one fourth left. Now a half of the remaining one fourth second has passed, leaving us with an eighth. Soon we are left with a sixteenth, and later a thirty-second of our deaccelerated second. Our second is now rapidly drawing to a close. But before it ends it must pass through the time when it has only a hundredth left, and a ten thousandth, a millionth, a billionth, a trillionth, and a hundred million billionth of a second left.

Now I am coming to the point of my question. We know that this second comes to an end. It must, because we live through hundreds of them a day. But before this second ends, it must pass through the fractions that, combined, make it up. So when the second has ended it has traveled through all of the numbers that are made into a fraction.

Since the second ends, all of the numbers are ended, too. If numbers were infinite, a second would never end, but since a second does end, it proves that numbers are finite.

Hoping that I have made myself clear, and that I have opened a topic for discussion, I remain.—Leonard Krately, 28 East Oglethorpe Avenue, Savannah, Georgia.

Wanted: a Chemist.

Dear Editor:

The January issue is quite remarkable. It has so much abstract physics in it that it left me even dizzier than I was before. Perhaps I should not have demanded more science so strenuously. I am getting a little more than I expected. Not that I can't take it.

But this materializes in me a suspicion I have about, for I am I forgetting *Lo!* Oh, well, perhaps I am too impatient.

more with abstract things. In the past the most abstract ideas authors used were time traveling and trips through the fourth dimension, with a few exceptions. But lately ordinary time and four or five dimensions are not enough for the authors. They must have supertimes, and infra, ultra, and nonexistent dimensions. And since even the entire conglomeration of super and infinitesimal universes and all cosmos is not enough, we have to be taken beyond infinity and in the space within the curvature of our own universe. Not that I am complaining.

But somehow there always pops up within me a little irritating spark of an idea that perhaps all these big words are just other terms for things which we have always had with us; and that all these outpourings of the frantic authors are things which they concoct without any real understanding. Just a suspicion, you understand.

Since science-fiction is going more deeply into the abstract realms, and it is harder to understand what is taking place, and what will happen next, I wonder if authors aren't taking advantage of the readers by making their theories too superficial—by jumping to conclusions and failing to correlate cause and effect.

I was going to use Chan Corbett and his extreme infinitesimal calculus as an example. He makes a very nice argument about the applicability of accepted mathematics and jumps to his expanding explosion of nothingness with seemingly no connection between the two. Or maybe I couldn't see the one that was there. I also couldn't see what happened to all the matter in the universe, but that is a minor contingency. On the other hand, the author has his license to use any combination possible, on the mere chance that there might be a connection, like in *Sklar's* story, *Elimination*. Otherwise, there wouldn't be any story to read.

It seems, then, that the factor which makes a story more or less plausible is how close the author hits to the correct combinations of possibilities. From which it follows that the reason I do not like *Fear* is that I expect that he never seems to strike the possibilities which appeal to my particular brand of imagination.

For instance, in *Metamorphosis* he overlooks a few facts which seem important to me. First of all, I can't understand the fuss over creating matter from energy. Other authors have done it without dire results. But, of course, *Fear* has his right to try any combination of possibilities he desires. The only trouble is, Einstein, Millikan, and others have shown that matter is being created from energy all the time in interstellar space, *Fear* seems to believe that it happened only at the beginning. (Not that it means much, but I wonder what was there before.) And then he starts on his eternal cycle. Authors seem to like cycle stories lately. *Beyond Infinity* has one, too. Incidentally, that story reminded me exceedingly of the *Mathematica* stories.

When I say that I think authors do not know what they are talking about, I wonder whether I do, myself. I am beginning to feel discouraged. Maybe I am falling behind the times. When I was in my prime authors used as heroes ordinary chemists and physicists working in ordinary laboratories, and when something went wrong the disturbance only created a rumpus in a single State, or at least in the continent. Instead of throughout the entire universe. And once in a while the scientists even knew what they were doing.

For instance, when Campbell used his time-distortion machine, did it throw half the cosmos out of joint? It was damn hard enough to understand, but it worked the way it was supposed to. After all, scientists are usually well-educated people who know what they are about, and when they do an experiment they know what they are after, not like dippy scientificists who set off a rocket which either explodes or doesn't budge an inch.

It is also discouraging to read about all these remarkable things happening to scientists when you never hear about these things really coming about, for I am I forgetting *Lo!* Oh, well, perhaps I am too impatient.

Anyway, will you please do a chemistry student favor and print a story about an ordinary chemist, something like *Foetus-eighty-seven*? It sometimes gets tiresome reading about so many extraordinary things, and for a change it would be a novelty to have something about real, human, scientific achievement. In their hunt for new fields to conquer, the authors have lost sight of the fact that there are people in the world. Not entirely, though. *S O S in Space* was a very nice story. *Infra-Universe* has a touch of human interest.

About Science Discussions. What system, if any, are you going to use? Will we have definite subjects to talk about, or will we just argue about anything that happens to come our way? I am in favor of the second, although it does not make for very complete discussion of a particular subject.—Milton A. Rothman, 2113 North Franklin Street, Philadelphia, Pennsylvania.

Concerning Escape Velocity.

Dear Mr. Tremaine:

Herewith another "first" letter, attracted by your new feature of Science Discussions. At the outset I want to strike a new note by carefully refraining from telling you how to edit, your authors how to write, and your artists how to draw. If I knew better myself I'd do it better and push you out of the market. As I could not do better to save my life, I accept the fact that the laborer is worthy of his hire and cheerfully pay spot cash every month for whatever you and your staff have to offer me.

I would like you to grant me space in which to express my views on the so-called escape velocity and, although I am anxious to obtain the opinions of other readers, I think it necessary to warn them that they will be rushing in where many scientists, including Sir Ambrose Fleming, have feared to tread.

In the first place, it is necessary to point out the fundamental difference between a projectile and a rocket. The former moves solely by virtue of an initial impulse, while the latter is moved by an uninterrupted output of power, the source of which is carried with it. Disregarding other than these basic factors, the difference expresses the difference between the sister sciences of ballistics and astronautics.

Fictionally and scientifically, but not legally, the escape velocity is a computation of ballistics that, for some mysterious reason, has been adopted by astronautics. Obviously, it is a simple matter for ballisticians employed by armaments concerns who have to hand endless data concerning the ratio between trajectory, range, and muzzle velocity, to work out a theoretical counter-gravitational speed and call it "the velocity of escape." Bearing in mind that a projectile starts at maximum velocity, loses pace because of friction and inertia, and finishes at minimum velocity, let us compare it with recoil propulsion as expressed in the simple device called the rocket.

Here we have an instrument the behavior of which is exactly contrary to that of projectiles: it starts from rest, assumes no particular velocity except at a given point, and its progress is one of acceleration. This is due to the fact that recoil efficiency is in direct proportion to the forward speed of the rocket, or the backward speed of its exhaust gases. In other words, the faster it goes, the faster it goes.

Without being deeply scientific, it appears to me that a rocket that has raised itself one foot off the ground has succeeded in conquering gravity to that extent, and so long as the same output of power is maintained, and it continues to raise itself foot by foot, the conquest persists. I fail to understand why a rocket should have to boost itself to a speed of seven miles a second and then, when fifty or sixty thousand miles in space, be regarded as having overcome the gravitational influence it had already overcome at Earth's surface. True, that at such a point the rocket might be able to coast without

power, but I am not concerned with this feature so much as the general and faulty assumption that such a speed is necessary before space can be conquered. Theoretically—I can concoct a few theories as expertly as any scientist—there is no reason why a rocket could not go from Earth to Mars at walking pace—given a sufficiently compact fuel.

Even when applied to its parental science of ballistics the escape velocity is not above suspicion. It tags Earth with the magical figure of 417 miles per minute, regardless of conditions. According to this, a missile fired from the north pole has exactly the same escape velocity as one fired from the equator, despite the fact that the equator is 11 miles farther from Earth's center of gravity, as well as having the benefit of the centrifugal effect of Earth's axial rotation.

It seems to me absurd that a missile fired directly into the Moon's gravitational maw, which is strong enough to raise tides, should have the identical escape velocity—or, I should say, needs it—as a missile fired from the opposite side of Earth with a combined Earth-Moon pull to retard it. It is equally absurd to assume the same necessary escape velocities in a missile fired along the orbital radii toward the Sun and another fired in the direction of Mars.

In conclusion, it is my expression that the escape velocity is not a fixed figure, but one that varies more or less according to a number of fluctuating circumstances, and that it is purely a ballistical computation which has little connection with astronautics.

Yours very sincerely, Eric Frank Russell, 44 Orrell Road, Orrell, Liverpool, 20, England.

Reminiscent of Brass Tacks.

Dear Editor:

I have just finished reading the December issue. I have fine except for the fact that there are no illustrations by Schneemann in it. How come? Did he break his neck, or get poison ivy on his hands, or water on the knee, or something? Or was he just plain every-day, backyard variety fired, and if so, why?

One other thing: *Trust in Time* was a good story, but the picture made my blood boil. In the scene depicted, the girl was being burned at the stake by 16th century Englishmen. The artist—Binder, was it not?—did his best to make them look like a cross between Roman soldiers and characters out of Buck Rogers.

Moreover, Eric was supposed to be shooting the girl, to end her suffering. Binder had him aiming at a startled individual in the crowd below her. Even the caption under the picture was wrong. In the middle of the third paragraph, in the right-hand column of page 26, from which the illustration was obviously taken, appear these words: "Choked with horror, Eric swung up his gun hand. The bark of the report sent half the crowd to its knees in terror, and he saw through the flames the girl's tall figure slump suddenly against her bonds."

Compare that with the caption, and you'll see there is something haywire. Not so good, Mr. Tremaine.

I enjoyed *World of Purple Light* very much, but there are a couple of honors there, too. In the first place, if the race of "atrog men" descended to the center of the earth "to avoid an Ice Age," then they must have been an incredibly ancient civilization, a civilization that vanished so long ago as to become legendary. How then, did Tom understand the recorded voice of one of them? Surely it is ridiculous to assume that a race of men who had a civilization greater than ours before the Ice Age spoke English!

The other mistake is a minor one, but it is a rather obvious point, so here goes. The question of a hollow world has been discussed before, and it is generally agreed that in such a place there would be no horizon. (N. B. Perspective would alter this statement.) The landscape would simply slope up and fade away in

the distance. And will some one please tell me how any light could possibly penetrate into such a place?

As to the rest of the stories: *The Flame Midget*—fair; *Frankenstein Unlimited*—degeneration of a good plot into a farce; *The Fourth Dynasty*—great! Let's have more like it; *The Expedition From Kyth*—overwrought plot; *The Incredible Invasion*—started out fine, but the ending was rather insipid. *Infra-Universe*—swell! Schachner always is.—Damon F. Knight, 803 Columbia Street, Hood River, Oregon.

From a Passive Reader.

Dear Editor:

I have never written before, being, I suppose, one of those passive readers. However, your new idea for stirring up Brass Tacks also stirred in me a desire to contribute. At least I can try. I don't believe in kicking against yarns. I don't care for—some one probably thinks they're swell. However, I will give you my opinion of your past issues, such as it is.

The December number was above average. *The World of Purple Light* warmed the cockles of my heart. I missed *Strange City* and regret it much. *Trust in Time* was also all high. Both were a bit weak in science, though. *The Incredible Invasion* ended well but was too drawn out. Two issues should cover your serials. *Infra-Universe* is off to a splendid start. A two-part novel is a gift from the gods. If they're longer than that one gets irritated and wonders if it will ever end. That is, unless it's an exceptional story. *Flame Midget* was good; a sequel might and might not improve it. *Frankenstein Unlimited* I considered to be unreasonably poor. Science Features are always good. I greatly enjoy John W. Campbell, Jr.'s series. Others were mediocre.

I liked the *Eternal Wanderer*, but thought the love element spoiled it. Considered the others to be average.

Godson of Almaru in October was good, but weak in science. *Nightmare Island* came too close after *Proteus Island* to be enjoyed properly. Perhaps other readers enjoy Kruse's fairy tales, but why not publish them as such? The others were the usual run—interesting but not rising above that.

One story you published a while back, *Little Hercules* was the title, I believe, most certainly needs a sequel. A good yarn, but very incomplete.

After that mixture of "bravos and bricks," I see no hope of having this printed! However, I want you to know that there's at least one "dumb Cauuck" that knows a good magazine when he sees it!—Robert N. Andrews, Creelman, Saskatchewan, Canada.

Résumé!

Dear Editor:

After a considerably long rest, I have decided to let you know my opinion on the Astounding magazines for the months of August through December.

I'll start with the stories in the August issue: *Incredible Invasion*; this story is improving with every issue and is beginning to build up to become one of the best I have ever seen in Astounding.

En Route to Pluto: just what is this story about? It is slightly off. There is no sense to the story.

Leap in the Fountain of Youth: rather an odd story, very simply told but of extreme interest as far as human situations are concerned.

Return of the Murians: a well-written and interesting story, but just medium for my personal taste; although others may think it excellent reading.

The Scarab: just interesting.

Black Light: almost idiotic. Practically no sense in permitting such rot in a magazine.

Proteus Island: we had better skip my opinion on this particular story.

The Cometceers: the conclusion was very much better than I thought it would be and it wound up into a very good story as a whole.

The September issue:

Finality Unlimited: rather an interesting story, but how did the thing end? The author leaves us stuck somewhere in the future, watching the same incident repeated—that of the striking of the pendulum.

The House that Walked: why, oh, why don't you put this kind of a story where it belongs—in a weird or fantastic magazine?

A Beast of the Void: justifies the issuing of the magazine for this month. Although it is slightly dry as far as the writing is concerned, it is still an awfully good story.

Little Hercules: an awfully nice story. Rather quaintly put, but interesting.

The Incredible Invasion: making wonderful progress. It seems so far that this is liable to outdo the story *Cometceers*.

Deeried Universe: no comment.

Song from the Dark Star: isn't worthy of a place in the magazine.

The October issue:

Godson of Almaru: a darn nice story, rather cleverly written and even logical, the way the author explains it.

Positive Inertia: science invades the sport! This is a fine story to start this particular line. Football is a national sport and football players are heroes, so it makes it all the more interesting.

Incredible Invasion: still keeping up the high average.

The November issue, as a whole, was very good, particularly the *Eternal Wanderer*.

As far as I have gone in the December issue—through the *Incredible Invasion*—I feel that it is going to be awfully good.

Until four months from this issue I shall cease to annoy you.—Thane Welsberg, 1528 West Indiana Avenue, Spokane, Washington.

Nova Scotia Speaks.

Dear Editor:

Accept my humble appreciation for producing the greatest of all science-fiction magazines. In my opinion it is a great source of information in science matters, for every story contains some interesting science points, and many of them are based on fact.

Mr. H. P. Lovecraft is, I think, barring the late Mr. Stanley Weinbaum, one of, if not the best, writers you have ever had in your ranks.

Next to him is Mr. N. M. Schachner. Mr. Marchionni and Mr. Wesso are by far your best artists. They are about equal, but Wesso shows more character in his drawings than any other magazine artist I have ever seen. Mr. Brown is also very good on cover sketches, but I don't think he is half so good on an inside job.

Mathematics is the greatest science-fiction story I have ever read, and I have nearly worn out the edition of my collection containing that story loaning it to my friends, who were all of the same opinion as myself. I would like to state that it has converted more people to your magazine than I did myself.

The Cometceers was a great serial, but as I did not read the story to which it is a sequel, I can't comment on its relation to it. But if the sequel is much better than *The Cometceers*, it is an excellent story indeed.

As I am a biology student, Mr. Weinbaum's stories, which appeared in the past year, appealed to me greatly.

How about another serial by Lovecraft soon? Keep up the good work and keep furnishing us readers with the stories which make our magazine the best on the market in the line of science-fiction.—Donald Ward, Armadale, Halifax, Nova Scotia.

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